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AUSTRALASIAN ANTARCTIC EXPEDITION, 1911–1914.*

By Sir DOUGLAS MAWSON, D.Sc., B.E.

Some three years ago, when preparations were being made for departure, I dealt with the plans of the Australasian Antarctic Expedition in a paper published in this *Journal*.† Since then, only very meagre accounts have appeared, and it now remains for me to supply a comprehensive story of our work.

The object of the Expedition was to investigate the Antarctic Continent to the southward of Australia, a region where the continent was supposed to extend far to the north, but concerning which only the most scanty information was at hand. Most of the expeditions of late years have had as their objective the South Pole. Consequently, in order to secure the most promising route, their fields have much overlapped, and the area of the unknown has not diminished commensurably with the magnitude of those undertakings. There is still a vast unknown area at the southern extremity of the Globe, and now that the Pole is reached, it is hoped, in the interests of science, that no further consideration will arise to cause future expeditions to follow upon each other's tracks, until at least a superficial knowledge of the whole has been attained.

Since the year 1840, no soul has been within the limits of the Antarctic Circle in the region selected by us as a field for operations. The only information concerning this region was the following :—

In the year 1839, Balleny, in the sealing vessel *Sabrina*, reported the

* Royal Geographical Society, Queen's Hall, June 9, 1914. Map, p. 340.

† *Geographical Journal*, vol. 37, p. 609.

appearance of land at a spot near the Antarctic Circle in longitude 120° E. Sabrina Land, as this afterwards appeared on the chart, we have proved to be non-existent.

Secondly, a French Expedition, under Admiral Dumont D'Urville, sailing south from Hobart in the year 1840, came in sight of about 150 miles of an Antarctic coastline within the Circle, situated between longitude 136° 30′ E. and 142° E. To this he gave the name of Adelie Land. D'Urville made a landing on a rocky islet adjacent to the unscaleable ice cliffs of the mainland. The existence of this land we have been able to confirm.

Thirdly, Admiral Wilkes of the United States Expedition of 1840, reported sighting land at frequent intervals during a long voyage from east to west, close to the Antarctic Circle and in the very region to which our own efforts were directed. Many of these reports of landfalls we have found to be erroneous. Notwithstanding such discrepancies, Wilkes's work is of much value. He outlined the northern edge of the pack as it existed in 1840, and supplied several shallow soundings more convincing as to the proximity of land than his otherwise vague and oftentimes ill-founded statements. Whilst criticizing the work of Wilkes, however, the magnificent seamanship and heroic determination of the leader should never be forgotten. The hazardous voyage of the *Vincennes* through 2000 miles of ice-strewn sea in high southern latitudes, a zone where gales are frequent even in summer, will ever remain a great achievement.

Besides the reports proceeding from those voyagers, now to be considered ancient history as Antarctic literature goes, note should be taken of Kaiser Wilhelm II. Land (at the western limit of the region investigated by us), discovered by Professor Drygalski's German Expedition of 1901; also of Oates Land (to the east of the sphere of the Australasian Antarctic Expedition), sighted by the *Terra Nova* in charge of Lieut. Pennell of Scott's recent Antarctic Expedition.

It was our intention to land several self-contained wintering parties at widely separated points between longitude 90° E. and 158° E., each to make continuous scientific records at the base-station, and to investigate the surrounding region by sledge journeys. On the southward voyage, a party was also to be left at Macquarie island, a little-known possession of the Commonwealth. Wireless telegraphy was to be used for the first time in Polar exploration, our Macquarie island station transmitting Antarctic news to Hobart.

The vessel selected and fitted for the work was the *Aurora*, with a carrying capacity of about 600 tons. She had been built in Dundee, and, prior to the Expedition, was engaged sealing and whaling in the Arctic. Captain J. K. Davis (extra-master), formerly of Shackleton's *Nimrod*, was appointed Master of the S.Y. *Aurora* and Second-in-Command of the Expedition.

SIR DOUGLAS MAWSON.

DR. MERTZ.

LIEUT. EDWARD F. NINNIS.

CAPTAIN J. K. DAVIS.

G. F. AINSWORTH.

FRANK WILD.

The ship's company numbered twenty-five, including :—

J. H. Blair	First Officer (during the later stages of the Expedition).
P. Gray	Second Officer.
C. P. De la Motte	Third Officer.
F. Gillies	Chief Engineer.

The Macquarie Island party comprised :—

G. F. Ainsworth	Meteorology ; also in charge of the station.
L. R. Blake	Geology and Cartography.
H. Hamilton	Biology.
C. A. Sandell	Wireless Telegraphy.
A. J. Sawyer	Wireless Telegraphy.

The Staff at the Main Antarctic Base, Commonwealth Bay, Adelie Land, included, besides myself :—

Lieut. R. Bage, R.A.E.	Astronomy, Magnetics, and Tides.
C. T. Madigan	Meteorology.
Lieut. B. E. S. Ninnis, R.F.	In charge of dogs.
Dr. X. Mertz	In charge of dogs.
Dr. A. L. McLean	Chief Medical Officer, Bacteriologist.
F. H. Bickerton	Air-tractor sledge.
A. J. Hodgeman	Cartographer and Sketch Artist.
J. F. Hurley	Official Photographer.
E. N. Webb	Chief Magnetician.
P. E. Correll	Mechanician and Assistant Physicist.
J. G. Hunter	Biology.
C. F. Laseron	Taxidermist and Collector.
F. L. Stillwell	Geology.
H. D. Murphy	Stores.
H. Hannam	Wireless Telegraphy.
J. H. Close	Assistant Collector.
Dr. L. A. Whetter	Surgeon.

The Staff of the Western Antarctic Base comprised :—

F. Wild	Leader.
A. D. Watson	Geology.
Dr. S. E. Jones	Medical Officer.
C. T. Harrison	Biology.
M. H. Moyes	Meteorology.
A. L. Kennedy	Magnetics.
C. A. Hoadley	Geology.
G. Dovers	Cartography.

In addition to these were the following six gentlemen who joined later and accompanied the vessel on one or other of the voyages :—

Sidney Jeffryes	Wireless operator, who relieved Hannam during the second year.

E. R. Waite	(Curator Canterbury Museum, Christchurch), Biologist, first sub-Antarctic cruise.
Professor T. Flynn	(Hobart University), Biologist, second sub-Antarctic cruise.
J. Van. Waterschoot van der Gracht	Landscape artist, second Antarctic cruise.
Captain James Davis	Whaling authority, second Antarctic cruise.
C. C. Eitel	Secretary, second Antarctic cruise.
N. C. Toucher and later F. D. Fletcher	Served in the capacity of Chief Officer on the *Aurora* during the earlier voyages.

The Start.—Our headquarters in the Commonwealth was Hobart. From there the *Aurora* sailed on December 2, 1911. Our good fortune commenced almost immediately, for a violent gale was weathered off the Tasmanian coast without any more serious consequence than the loss of half the bridge and slight damage to the motor launch. Deeply laden as we were, the decks lumbered with cargo, we had every reason to congratulate ourselves on the *Aurora's* sterling sea-going qualities, and the abilities of Captain Davis and his staff.

Macquarie island, a sub-antarctic possession of Tasmania, situated in the same latitude as South Georgia, was sighted on December 11. There exists there but one main island around whose shores are many rocky reefs and islets. Rocks also appear for many miles to the north and south rising from a submarine ridge, which is the submerged continuation of the main island itself. The habitable island has a length of over 20 miles and greatest breadth of 3½ miles. The chief vegetation is tussock grass and Kerguelen cabbage, but it abounds in a truly wonderful population of birds and animals. At one time it was a favourite haunt of the valuable fur seal, but for fifty years or more only odd specimens have been seen. The ruthless slaughter by the early sealers is responsible for this almost complete extermination. Sea elephants, however, are numerous, the bulls being met with up to 20 feet in length and weighing probably some 2 tons.

Very little accurate information was known concerning the island, and the only available map preceding Blake's survey was a sketch made by a sealer. Rumours of the existence of wingless parrots and other continental forms of life indicated that perhaps Macquarie island was the last remaining summit of a vast sunken southern land. Other evidence also suggested that probably at one time such a land existed uniting Australia with the Antarctic Continent. There was, indeed, an interesting field for scientific work.

A preliminary examination of the Island was conducted preparatory to settling the site for a permanent station. This was eventually chosen on a low neck of land at the north end of the island. There a hut, coal store, and instruments for a year's occupation were landed, in which work our excellent motor launch proved most valuable. Next the masts,

stays, engines, apparatus, and materials for constructing a receiving hut and an engine house were landed at an adjoining spot below a precipitous hill. Eventually the wireless station was erected on the summit 350 feet above sea-level. To transport all the gear from the sea shore up the cliffs to the summit was a difficult piece of work. Under Wild's able

THE ANTARCTIC REGIONS AS KNOWN AT THE PRESENT TIME.

guidance, however, it was accomplished, use being made of a "flying fox" stretched from the summit to the strand. Even the landing of materials was no mean work, for there are no harbours at Macquarie island, and situated as it is in a windy belt, the roadsteads are not as serviceable as they would be under different climatic conditions.

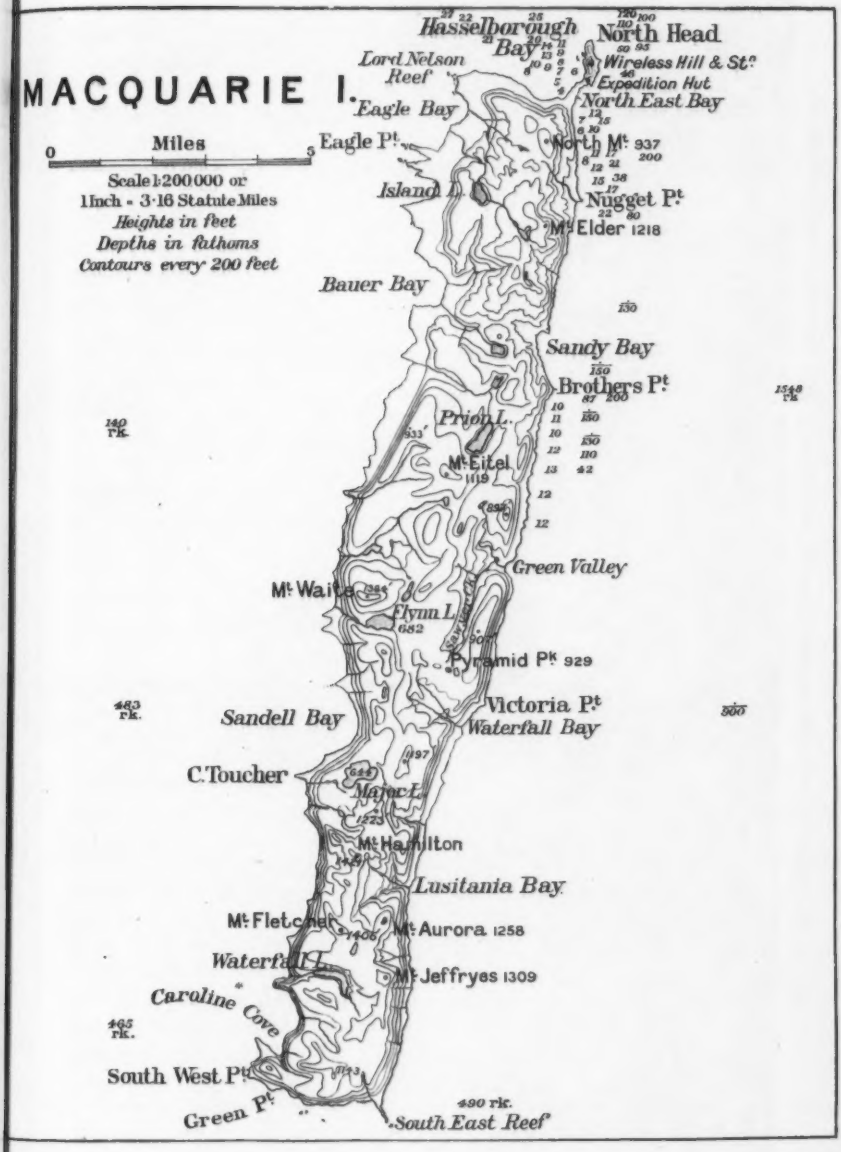
A small steamer, the *Toroa*, chartered to carry coal for us as far as Macquarie island, arrived and replenished the *Aurora's* bunkers before the latter continued her southward voyage. To effect this the two ships were anchored a quarter of a mile apart, and the coal transported in whale-boats and the motor launch. On arrival at the island we discovered a shipwrecked party whom we succoured and sent back to civilization by the *Toroa*. The remains of their vessel the *Clyde* lay almost high and dry on a reef in North-East bay near our station. On Christmas Eve, leave was taken of the Macquarie island party, who were destined to remain there for two whole years.

Steaming south from Macquarie island, the first ice was met in lat. 64° S., and in lat. 65° 40′ S. the pack became impenetrable. The vessel was headed west, and repeated attempts made to work southwards through the pack. Eventually at 6 a.m. on January 3, when skirting a field of ice, travelling before a fresh breeze in thick weather, a continuous ice wall ranging from 40 to 100 feet in height was dimly discerned through the falling snow on the port side. Our position was then approximately lat. 65° 40′ S., long. 144° E. The weather cleared, and investigation showed it to extend for a great distance, as if it were part of some land mass. On the return of the *Aurora*, the following summer, this formation was discovered to be a floating iceberg of stupendous proportions; its length being quite 40 miles. In the interval of a year, it had shifted its position about 50 miles to the north-west. At the western end of this berg, a narrow strip of pack was negotiated and open water extended to the south. Then a strong blizzard arose which was weathered out under the lee of the berg.

Further progress to the south was made when the conditions permitted. During the afternoon of January 6, an ice cliff loomed up ahead, extending to the horizon in both directions. This proved to be an immense barrier tongue—afterwards named the Mertz glacier—pushing 60 miles out to sea from a great ice-capped land. This land, along which we steamed during the next two days, had never before been seen. Its continuity with Adelie Land was subsequently proved, and it was then decided to include our new discoveries under the same title. The land rose up everywhere from the sea to form a plateau. Only rarely did portions of the rocky platform break through the ice-sheet. Numerous rocky islets fringing the coastline were a notable feature, and these formed admirable breeding grounds for marine birds.

Flocks of sea birds in great variety flew around the *Aurora*, as if welcoming our entrance to their unbroken solitudes. Alas for those beautiful creatures, for we were destined to reap a harvest from amongst them. The eggs of most were either rare or unknown, and some of the birds were entirely new to science.

At a point some miles from the nearest portion of D'Urville's Adelie Land a suitable spot was discovered for a wintering station. This was a


MACQUARIE I.
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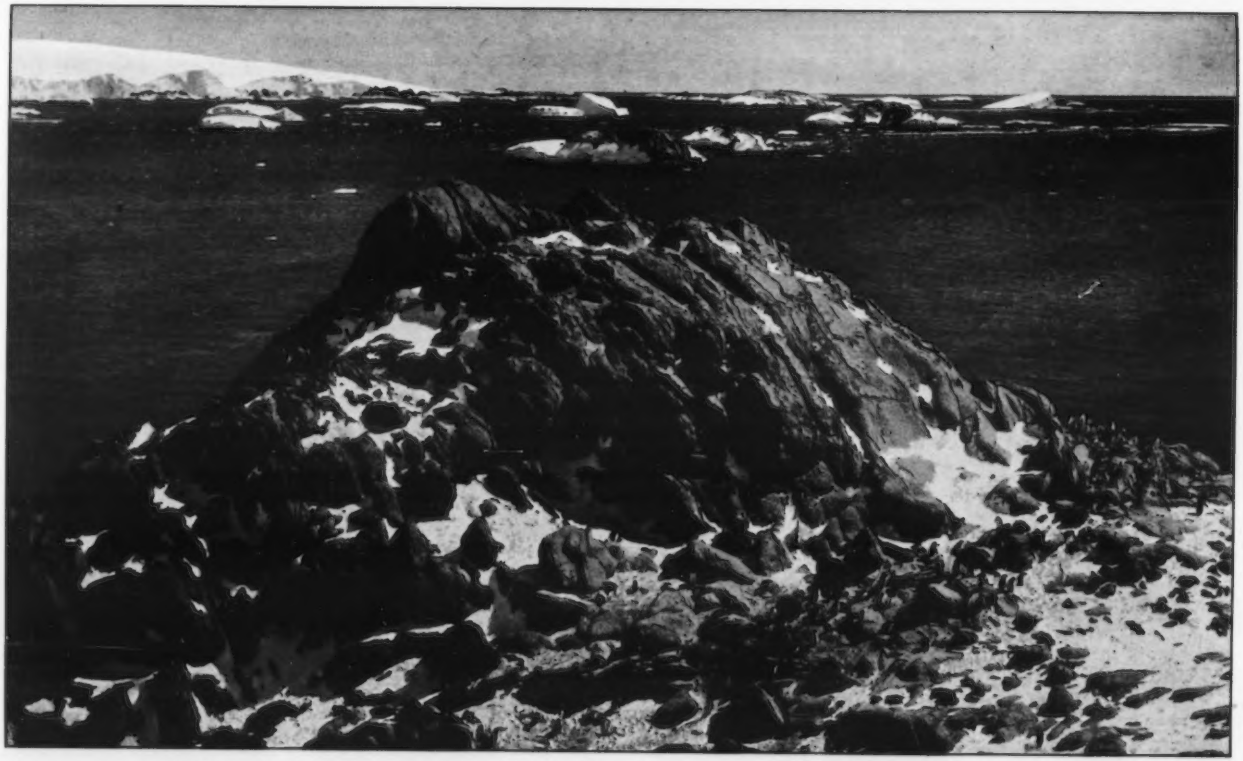
Scale 1:200000 or
1 inch = 3·16 Statute Miles
Heights in feet
Depths in fathoms
Contours every 200 feet
Hasselborough Bay
North Head
Lord Nelson Reef
Wireless Hill & St.
Expedition Hut
Eagle Bay
North East Bay
Eagle Pt.
North Mt. 937
Island L.
Nugget Pt.
Mt. Elder 1218
Bauer Bay
Sandy Bay
Brothers Pt.
Prion L.
Mt. Eitel 1115
Green Valley
Mt. Waite
Flynn L. 682
Pyramid Pt. 929
Victoria Pt.
Sandell Bay
Waterfall Bay
C. Toucher
Major L.
Mt. Hamilton
Lusitania Bay
Mt. Fletcher
Mt. Aurora 1258
Waterfall L.
Mt. Jeffryes 1309
Caroline Cove
South West Pt.
Green Pt.
South East Reef
490 rk.

rocky outcrop, a little over a mile in extent, henceforth known as Cape Denison. In this location rocks projected from under the ice-sheet within a sweeping indentation of the coastline which we named Commonwealth bay.

In Commonwealth bay the coast is dangerously bordered by rocky islets and reefs. With the object of selecting a passage and an anchorage for the ship, a preliminary examination of the in-shore waters was made by a party in the whaleboat. Late that evening a gale of wind commenced to blow off the land. The motor launch had, meanwhile, been despatched ashore, and by the time it arrived back at the ship a high sea was running. In order to save the launch the risky proceeding had to be adopted of steaming into the wind until close under the lofty ice cliffs, where calmer water was found. While this expedient was being carried out, a few very anxious moments were passed, for the bottom was shallow, rocky, and uneven. Fortunately the calmer water was reached without accident, and the anchor dropped in 6 fathoms.

The launch again caused anxiety by breaking away just as preparations were being made for hoisting it up. Away it went before the wind with Bickerton, Hunter, and Whetter on board. The rudder had been unshipped, and in the sea which was running Whetter found it impossible to step it properly. After many futile attempts a temporary fastening was made. Worse still, though Hunter got full duty out of the hand pump, the water breaking over the sides affected the motor and caused trouble in starting. They had drifted half a mile and were approaching a rocky group of islets where they would have met with destruction, when we saw the launch start by her own power and were thankful it was no later.

Although summer was at its height, the weather proved little better than a succession of gales directed off the land, veering between south and south-east. This state of things greatly hindered landing operations. We were fortunate in finding an excellent boat harbour at Cape Denison, between which and the ship the motor launch continually plied whenever the weather was propitious. Tentative arrangements had been made for the landing of three separate parties at intervals along Antarctic shores, should opportunities arise. Upon discovering the wind-swept and desolate nature of the newly discovered land, I decided to attempt only two bases, amalgamating the smallest of the subsidiary bases with the main base. In the light of subsequent events it was well we did this, for the climate, and, consequently, the exploration of Adelie Land, proved to be the toughest task on any yet known Antarctic land—for the matter of that of any land. Eventually, by January 19, the whole of the stores and gear of the main base were transferred to the shore. I gave instructions to Captain Davis regarding explorations to the westward and the landing of a party under Mr. F. Wild. From our tent doors we watched the good ship steaming over the western horizon, advancing into the great unknown.



A VIEW OF THE ISLETS OFF THE COAST OF THE MAINLAND LOOKING WEST FROM STILLWELL ISLAND, ADELIE LAND.

IN MEMORIAM CROSS TO LIEUT. NINNIS AND DR. MERTZ.

THE 1000-FEET COASTAL CLIFFS, KING GEORGE V. LAND.

The *Aurora* steamed west for a day along the coast seen by D'Urville and Wilkes in 1840, until the limit of open water was reached. This stretch of navigable sea we named the D'Urville sea. Later, we discovered that the absence of pack-ice is due to the persistent gales setting off the land in that locality. The coast of Adelie Land could be traced in a westerly direction, but, on account of heavy pack, the vessel could not follow along the coast, the only course being to skirt the heavy ice to the north and west. At this point Davis expected to sight the high land reported by the United States Squadron (1840) as lying to the west and south-west, but no land was seen.

In long. 132° 30′ E., they were able to stand south again and shortly afterwards passed over the charted position of D'Urville's Côte Clarie. Quoting from Capt. Davis's report: "The water here was clear of pack ice, but studded with bergs of immense size. The great barrier which had been followed for 60 miles by the French ships in 1840 had vanished—nothing remained to mark its former position except a collection of huge bergs. At 10 a.m., having passed to the south of the charted position of Côte Clarie, we altered course to S. 10° E. true. Good observations placed us at noon in 65° 2′ S. and 132° 26′ E. with a sounding of 160 fathoms on sand and small stones. We sailed over the charted position of land east of Wilkes' Cape Carr, the weather was clear and there was no trace of land to be seen in this locality."

A few hours afterwards still steaming south new land was sighted—icy slopes rising from the sea, similar to those of Adelie Land, but of greater elevation. Shallow soundings were obtained. Fast floe ice extended far out to sea from the land, and the nearest approach the ship made was 12 miles distant.

To this discovery we gave the name of Wilkes Land, to commemorate the name of a navigator whose daring was never in question, though his judgment as to the actuality of *terra firma* was unreliable.

Captain Davis steamed west, keeping the land in sight, until the evening of January 24, when the ice headed him off to the north. During the next four days violent gales and heavy seas prevailed. The view was obscured by driving snow so that nothing was visible.

It was not until noon on January 31 that the atmosphere was sufficiently clear to see any distance. The ship was then pushing south amongst heavy pack ice in the vicinity of 120° E. long. A portion of Balleny's Sabrina Land was sailed over, and there was no indication of land in the vicinity. Finally a point was reached 7 miles from a portion of Wilkes's Totten's Land, reported to be high land. A sounding gave 340 fathoms. The weather was clear and high land would have been visible at a great distance. It was therefore apparent that Totten's Land either does not exist at all or is situated some distance from its charted location. The pack was too heavy for the ship to

THE 1000-FEET COASTAL CLIFFS, KING GEORGE V. LAND.
IN MEMORIAM CROSS TO LIEUT. NINNIS AND DR. MERTZ.

penetrate further to the south, so a course was set to the west. Heavy pack barred the way to the south.

Some days after, the vicinity of Knox Land, of Wilkes's charts, was reached. With the exception of Adelie Land, which the French sighted some days previous to the Americans, the account by Wilkes concerning Knox Land is more convincing than any other of his statements relating to new land. If not already disembarked, we had counted on settling our Western Base in this place. It was, therefore, very disappointing when heavy pack ice barred the way, at a point still north of Wilkes's furthest south in that locality. Three attempts to force a passage were made. They were, however, without avail; in the third case the vessel was extricated only with great difficulty. No land had been sighted, but soundings indicated that land would in all probability be met with to the south. Repulsed from his attack upon the pack ice in that vicinity, Captain Davis decided to go still further west. The course made carried them to the north-west.

Early on the morning of February 8, in foggy weather, a wall of ice about 80 feet high appeared across the bows extending in a north-westerly direction. Following this along, the weather cleared and it was recognized to be the face of an extensive flat-topped mass of floating ice. Rounding a cape to the west, and passing through loose ice, open water was reached to the south. Fifty miles in that direction the sea was found to shallow rapidly, and a maze of large grounded bergs was entered. The bottom was found to be very regular, ranging between 110 and 120 fathoms.

After several days' delay owing to a blizzard, they were able to push south again on February 11. The last of the obstructing ice was negotiated on February 13, and the ship steamed into a broad sheet of water still stretching to the south. This open sea inside the pack-ice belt we ascertained, later, to be a permanent feature of that vicinity, and to it I gave the name of the Davis sea, after the intrepid captain of the *Aurora*.

One hundred miles further to the south, in lat. 66° S. and long. 94° 23′ E., the icy slopes of new land were seen extending east and west as far as the eye could reach. The sphere of operations of the German Expedition of 1901 was now near at hand, for their vessel, the *Gauss*, had wintered frozen in the pack about 125 miles to the west. The land to the south, which the Germans visited by sledge journey over the pack ice, was eventually proved by one of our own sledging parties to be continuous with the new land now sighted by the *Aurora*. The "high land" in the direction of Wilkes's Termination Land, seen by the Germans during a balloon ascent, we found to be a high ice-sheathed island about 9 miles in diameter. To this we gave the name of Drygalski Island. The position marked for Termination Land on Wilkes's charts we found to be occupied by pack-ice and a barrier-ice formation (marginal shelf-ice).

The formation in question, trending about 180 miles to the north from

the newly discovered land just referred to, was found to be very similar in character to the well-known Ross Barrier over which lay part of Scott's and Amundsen's journeys to the South Pole. This we named the Shackleton ice shelf. Its height is remarkably uniform, ranging between 60 and 100 or more feet. Making allowance for the average specific gravity, this indicates an average total thickness of perhaps 600 feet. In area it occupies many thousands of square miles.

This wonderful block of ice originates fundamentally from the glacier-flow over the great plateau-land to the south. Furthermore, every year an additional layer of consolidated snow is added to its surface by the frequent blizzards. These annual additions are clearly marked on the dazzling white face of the ice-cliff. There is a limitation placed upon this increasing thickness, for the whole mass is ever moving slowly to the north, driven by the irresistible pressure of the land-ice behind. *Pari passu* with this advance its northern face is crumbling away before the action of the sea, breaking down into bergs and brash-ice.

During the third voyage of the *Aurora*, we had the unique experience of witnessing this crumbling actively at work. As we were steaming along within 300 yards of the cliff face, suddenly a mass weighing perhaps a million tons broke away, first sinking down into the sea. Then followed an interval of a few minutes, during which it majestically rose and sank alternately accompanied by a rapid splitting up. At the end of five minutes only small bergs and brash ice remained.

To return to the *Aurora* within sight of new land. As they steamed in towards the rising slopes an extensive floating ice tongue with cliffs 100 feet high was kept on the "port" side. Captain Davis writes on February 13: "We followed the western side of the tongue in a southerly direction until 5 p.m., when we were stopped by fast ice extending right up to the land. We sounded in 250 fathoms on mud; the land appeared to be from 25 to 30 miles from our position. Wild landed and made a short journey towards the land. On his return he reported that the land was fully 25 miles from the point he had reached and that the ice was evidently breaking up."

It had now become imperative to land the Western Party. After a consultation, Captain Davis and Mr. Wild decided that under the circumstances the landing of the wintering party should be attempted on one of the floating shelf-ice formations, as nothing better presented itself. The ice tongue near at hand suggested itself as suitable. Fortunately before landing the impedimenta a reconnaissance was made, with the result that it was discovered to be nothing more than a huge iceberg about 24 miles in length. Eventually a location was chosen on the Shackleton ice shelf. The spot selected was about 17 miles from the land itself—the nearest approach possible by the ship. Just there the low floe-ice—the frozen sea surface—met the great ice-wall of the shelf-ice sheet. Then followed several days of hard work, getting the hut, stores, coal and instruments to the top

of the cliff. This was accomplished with the aid of a "flying fox." Twelve tons of coal was the last item sent up. On February 20, Captain Davis writes: "We did not get the coal ashore a moment too soon, as this morning our sledge track went to sea—in a N.W. direction—and this afternoon it is drifting back under the influence of a tide or current. I went up on the glacier with Wild this afternoon. It is somewhat crevassed for about 100 yards inland, and then a flat surface stretches away as far as the eye can see. We sail early to-morrow."

No time was lost in sailing, for the long campaign in the ice had left the ship desperately short of coal and ballast. It was then February 21, and negotiation of the pack-strewn sea was rendered more difficult and dangerous on account of the growing hours of darkness. In the regions traversed the climatic conditions proved worse than had been expected. Foggy weather or falling snow was the rule, gales were prevalent, and, worst of all, even within a few weeks of the height of summer, darkness enshrouded the midnight hours and rendered navigation amongst the ice precarious. However, the 2300 miles to Hobart were accomplished without accident, the vessel arriving on March 12 with only 9 tons of coal as ballast.

The vessel was refitted in Sydney and deep-sea dredging gear erected, capable of securing samples of the bottom-life in the deep ocean. On May 20, 1912, a voyage south was commenced to investigate the ocean floor between Australia and Antarctica. A call was made at Macquarie island, and several weeks were spent at the Auckland islands. There Mr. Waite, biologist, succeeded, amongst other things, in capturing six of the very rare flightless ducks indigenous to the Auckland islands. On July 11 the *Aurora* reached Lyttleton, New Zealand.

After outfitting in Melbourne, a second cruise was made between the dates of November 15 and December 15, 1912. On that occasion Professor Flynn accompanied the vessel as biologist. A large part of the work of both these voyages was the delineation of the floor of the ocean. Up till then, excepting those in the coastal waters of Australia, Tasmania, and New Zealand, very few depths indeed had been determined in that great stretch of ocean southward to the Antarctic continent within our sphere of operations. The contour of that ocean floor has a bearing on the theory of a lost southern continent. Thus the soundings obtained were of unusual interest.

The two most important results of the winter cruises of 1912 were, firstly, the discovery of a submerged island-like plateau southward of and about the size of Tasmania; secondly, a trough-depression was found to separate Macquarie island from the Auckland islands and others which stand upon the same submarine platform as New Zealand. In a report, Captain Davis, referring to the Oceanographical work carried out successfully during my absence in the Antarctic, writes: "Our success was due to the persistent efforts of all, a determination on the part of officers and

men to carry out successfully that portion of the work of the expedition assigned to the ship." The ship's company do, indeed, deserve very great credit for the able way in which they carried out their share of the work.

To return to the Main Base party in Adelie land. The hut was quickly erected and self-recording instruments housed and set running without delay. Preparations were made for autumn sledging and a journey commenced on March 1, 1912. The weather had been bad enough before, but on March 2 it became worse and my party returned, leaving the loaded sledge on the plateau. After that date there was no slackening of the wind, excepting for an odd hour or two, until far on in the spring. It was not until late in August that the sledge was recovered. During that interval we led a strenuous existence at winter quarters, buffeting with a sea of drifting snow which poured fluid-thick over the landscape. The average wind velocity in Adelie land proved to be far beyond anything previously known. The charts of the self-recording instruments show the average for the whole year to be 50 miles per hour. Average hourly velocities of 100 miles and more were common, and twenty-four hourly averages of over 90 miles were recorded. Frequently the air travelled forward in a series of cyclonic gusts, near the foci of which momentary velocities were reached very much higher than the averages mentioned. Thus pebbles were lifted and structures not buried in the *névé* thrown down. Fortunately, the hut was soon drifted over to such an extent that only a portion of the roof remained above ground. Entrance to the interior was effected in fine weather by a trap-door in the roof; at other times through tunnels in the *névé*.

For months the drifting snow never ceased, and intervals of many days together passed when it was impossible to see one's hand held at arm's length. The drift-snow became charged with electricity, and in the darkness of the winter night all pointed objects and often one's clothes, nose, and finger tips glowed with the pale blue light of St. Elmo's fire. Add to this, the force exerted upon the body, the indescribable roar of the hurricane, the sting of the fury-driven ice particles, and the piercing cold and some idea is got of the conditions under which the routine of outdoor observations was maintained. Such weather lasted almost nine months of the year. Even in the height of summer, blizzard followed blizzard in rapid succession.

When it became apparent that winter quarters was situated in the vicinity of the centre of a permanent anticyclone we modified the sledging gear to meet the unexampled circumstances and determined to face the elements as we found them. Tents similar to those used with such success by British expeditions in the Ross sea area were found quite impossible. Even when greatly strengthened their life proved very short. Three reconnaissance parties thus provided, setting out in September, 1912, had their tents torn to ribbons and were fortunate in reaching the hut

without serious accident. One of these parties led by Madigan, assisted by Whetter and Close, returned badly frost-bitten after a splendid effort. To save the tents two underground rooms were excavated in the glacier ice on the highway to the plateau at distances of $5\frac{1}{2}$ miles and $11\frac{3}{4}$ miles respectively from the hut. There quantities of stores were accumulated during the spring ready for an extensive summer sledging campaign.

The constant hurricane along the Adelie Land coast broke up the sea-ice as quickly as it formed and pushed it away to the north. To our great disappointment, therefore, we had to abandon any idea of sledging over the frozen sea. It was not until November 7 that there was sufficient moderation in the weather for a final start. Five diverging parties worked simultaneously, so that a maximum of new ground was covered during the comparatively short sledging season.

Stillwell, assisted by Close and Laseron, mapped in the coastline to the east as far as the Mertz glacier. Stillwell's map illustrates the immense number of rocky islets that fringe the mainland in that vicinity. There silver petrels, Antarctic petrels, Wilson petrels, snow petrels, cape pigeons, etc., were found nesting in large colonies.

Further east Madigan, assisted by McLean and Correll, continued the work, reaching 67° 14′ S. lat. and 150° 21′ E. long. Eastward of the Mertz glacier they found the sea frozen and travelled over it for the remainder of the journey, crossing the 15-miles-wide tongue of the Ninnis glacier and visiting several headlands by the way. In the vicinity of the Horn Bluff there is a sweep of coastline bounded by rocky cliffs, 1000 feet high. There they discovered coal and carbonaceous shales outcropping at an elevation of several hundred feet, associated with red sandstone and capped by an immense thickness of columnar dolerite. Madigan made frequent determinations of magnetic dip and azimuth. Nearer to winter quarters only gneiss and schists are exposed. The new land east of the Mertz glacier we have received His Majesty's gracious permission to name King George V. land.

It was across King George V. land that Ninnis, Mertz, and I made the sledging journey that ended so unfortunately. It was our intention to rapidly cross the coastal highlands to the south of the tracks of Madigan's party, and to pick up the coast beyond where they could expect to reach. To give the necessary increased mobility we commandeered all the dogs. The various other parties proceeded only by the sure but slow method of man-hauling. The outward journey proved unusually arduous, for it turned out that several coastal lobes had to be crossed, entailing repeated ascents to about 3000 feet and as many descents to near sea-level. Also, the intervening depressions occupied by more rapidly moving ice (glaciers) were found to be heavily crevassed, and many serious accidents were narrowly averted. It was when all these dangers were believed to have been left behind that the catastrophe occurred.

On December 14, when we had travelled outwards 311 miles, and were

Map showing the remarkable distribution of Islets fringing the coast-line of **ADELIE LAND** in the vicinity of **Cape Gray**

crossing the coastal highlands in 68° 54′ S. lat., 151° 33′ E. long., Ninnis, with his dog team and sledge, broke through the roof of a *névé*-covered crevasse and fell into an unfathomable depth below. All that could be seen was a dead dog, an injured dog, and a few fragments of the sledge load caught on a shelf 150 feet below. The moans of the injured dog ceased, and no sound was heard in answer to our frantic calls. Our loved comrade had without doubt been killed instantly. All the dog food and almost all the man food, besides the tent, pick, shovel, and many other necessaries had gone also. Mertz suffered the loss of his Burberry trousers: as a substitute he used henceforth an extra pair of woollen under trousers that happened to be saved. The six dogs remaining were the poorest of the pack, for the best preserved animals had been drafted into the rear team, as it was thought that the risk lay in front. Fortunately, there was saved a spare tent cover, and a frame was improvised, using a pair of ski and the theodolite legs. Later on a broken spade was picked up at an old camp.

Deliberating on what was to be done, it was concluded that a descent to the frozen sea would be dangerous on account of heavy crevassing in that direction and would undoubtedly cause delay. Further, the nature of the surface of the sea-ice along that coast was entirely unknown, and it was extremely likely that it would be breaking up. On the other hand, on sea-ice there was a chance of obtaining seals for food. It seemed to us, however, that as we now knew the nature of the country between us and winter quarters, a return journey over the plateau, avoiding most of the difficult areas met with on the outward journey, could be made in quick time, and by eating some of the dogs the food supply would last out. After full consideration, the latter plan was adopted. Nine hours later I read the burial service; our fallen comrade we had come to know as a man of fine spirit and high courage. His death was a sad blow to us.

We set our faces towards the hut. Owing to delays by bad weather, the ration had to be reduced further than had been anticipated. The dogs gave out daily, so that soon there were none left. The little flesh which they provided contained a minimum of nutriment and was difficult to digest. Nevertheless, early in the first week in January a point was arrived at 100 miles from the hut. For several days past Mertz had shown a derangement of the alimentary system resulting from the short and unsuitable ration. I was affected likewise to a less extent. We were very weak from want of food, and the weather was abominable—day after day nothing but dense falling and drifting snow. Starving as we were, the cold was felt intensely. The daily stages grew shorter.

On January 3, it became evident that my comrade's condition was worse than my own. The best food remaining had not the expected effect, and he turned quite against the dog's flesh. Even under those circumstances he remained cheerful and undaunted. I could not have wished for a better companion. The weather was a little clearer on January 6,

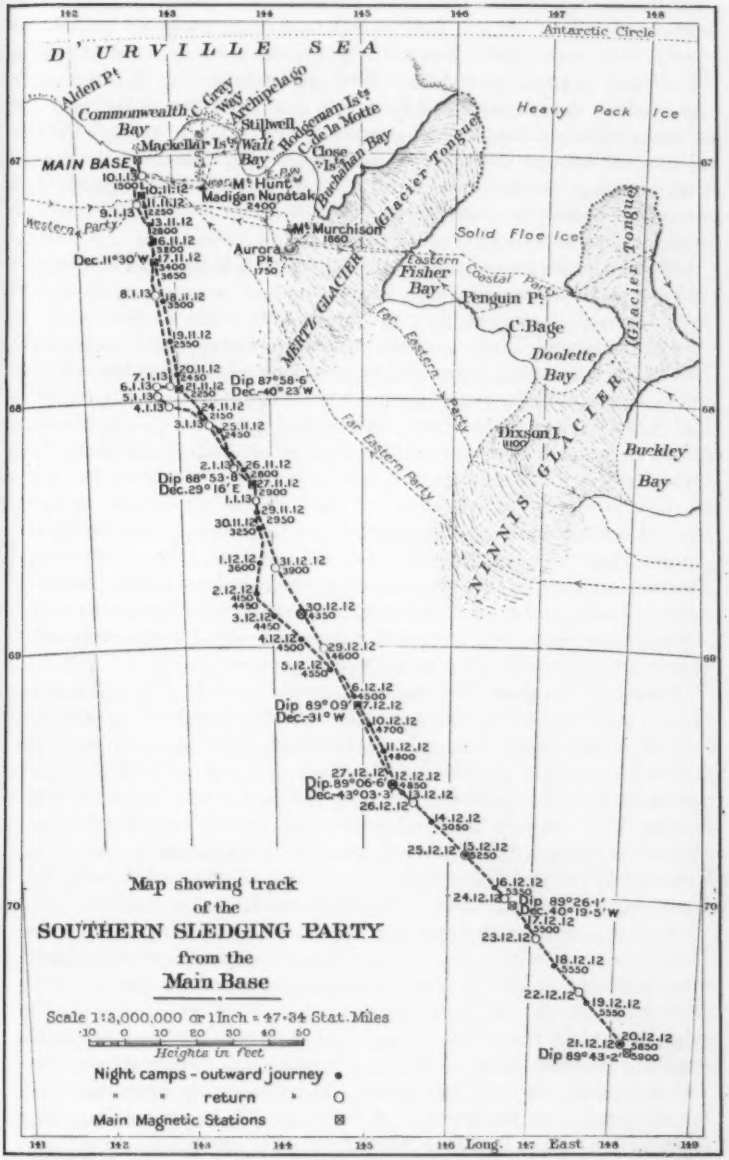
IN THE DRIFT BY THE MAIN-BASE HUT, ADELIE LAND.

AT THE 67-MILE DEPÔT; SOUTHERN PARTY AND SUPPORTING PARTY: ADELIE LAND.

THE FACE OF THE SHACKLETON SHELF. EACH BAND REPRESENTS AN ANNUAL SNOWFALL ADDITION.

WINTER AT THE WESTERN BASE HUT, QUEEN MARY LAND. THE HUT IS SEEN TO BE BURIED, ONLY THE TIP OF THE ROOF AND CHIMNEY PROJECTING. IN THE FOREGROUND IS THE ENTRANCE, A VERTICAL HOLE IN THE SNOW.

ENTRANCE, A VERTICAL HOLE IN THE SNOW.



but the slippery surface occasioned frequent falls, painfully jarring our emaciated frames. It was soon evident that Mertz could not proceed on foot. After some demur he agreed to try riding, but even with the help of the sail progress was slow. Much toil resulted in 2½ miles only recorded on the meter; certainly a less distance towards the goal, for it was possible in the drift to steer only a very rough course. On the morning of January 7, Mertz's condition was much worse, and about midnight January 7–8 he passed away after having been in a delirious and unconscious state for some hours. Thus died a man of sterling qualities whom we had all learnt to love as a brother.

My own condition was such as to hold out little hope, but I determined to push on to the last, anticipating that at least a record might be left near Aurora peak, a place likely to be visited by search parties.

On January 11, after spending three days, during which particularly bad weather prevailed, in arranging everything to facilitate forward progress, I resumed the march alone. The sledge had been cut down to half its length, and all the dogs' meat remaining had been cooked to save dragging the extra kerosene. It snowed and drifted almost every day. Fuller details of this journey will appear in our book relating the story of the expedition; suffice it now to state that after three weeks' creeping forward wherein most providential escapes from crevasses were experienced, I had the good fortune to stumble upon a cache of provisions. This cache, situated 20 miles from the hut, was one of several that had been left by a search party. The discovery of the food was a fortunate circumstance indeed, for had it been a little more to one side of the course it would have been invisible on account of the drifting snow.

Stimulated by good food, the march was resumed. The polished ice of the coastal downfalls was met, and with the wind blowing as it did, I found it impossible, in finnesko, to stand up. The crampons had been thrown away to lighten the load. Eventually a pair of makeshift crampons was made from the theodolite case, and nails and screws out of the sledge fittings. Thus the cave 5½ miles from the hut was reached. Then a strong blizzard reaching a velocity of 80 miles per hour caused further delay. The wind fell off on February 8. Descending the ice slopes to the hut, I saw the *Aurora* on the horizon, outward bound.

A party of six, Madigan (in charge), Bage, McLean, Bickerton, Hodgeman, and Jeffryes, were at the base, left to carry out the scientific observations for another year and make a search for myself and comrades. During my absence the party at the hut, assisted by members of the ship's crew, had re-erected the aerial of the wireless installation, the mast having been blown down the previous year. The ship was fitted with a receiving set, but was without the necessary apparatus for sending messages. On the evening of February 8 I despatched a message recalling the ship. It was a beautifully calm afternoon and evening, and we expected to be away early in the morning. As the ship came into

sight again, however, the wind rose, and, of course, there was no knowing how long it would continue, for, in Adelie Land, the calm periods are few and far between except at the height of summer. I had learnt from those remaining that great anxiety had been expressed by Captain Davis as to the safety of the western party in charge of Wild, should they not be relieved that year. In the absence of exact information as to the circumstances under which that party were living; the possible difficulties in effecting relief depending on the weather conditions in their locality; the special features of the pack-ice thereabouts from the point of view of navigation; and finally, from lack of information as to the condition of the ship, her coal supply, health of crew, etc., I could do no other than leave to Captain Davis, who was acquainted with those details, the decision as to whether he should delay any longer at the main base. Accordingly I sent a wireless message to the ship to the effect that I hoped the position would allow of the *Aurora* remaining a day or two longer in the hope of the weather calming, leaving the actual decision to Captain Davis himself. This message does not appear to have been picked up, and Captain Davis, in view of the gravity of the situation, did well in acting on his own responsibility. As evening came on the barometer fell and we saw no more of the vessel.

Of other summer sledging parties from the Main Base one was led by Bage to the south, inland over the plateau, and another led by Bickerton over the highlands to the west. Bage's companions were Webb and Hurley. Murphy (in charge), Hunter and Laseron formed a supporting party accompanying them for 67 miles. After leaving the coast no sign of rock was seen, their track lying over a desolate wind-swept plateau. The wind seldom ceased and drifting snow was the rule. This constant flow of air has cut in the plateau surface of Adelie Land deep sastrugi, of such dimensions as are not met with elsewhere. Hurley obtained excellent photographic records of them. Over those obstacles they dragged their sledges in the face of the wind for 300 miles out from the hut, to a point within a few miles of the magnetic pole. There an elevation of 6500 feet was reached. On one occasion a march of 40 miles was made. The magnetic data from that journey are particularly valuable, for Webb took full sets of observations for dip and azimuth at regular intervals. The difficulties with which he had to contend in carrying out such delicate observations in the biting wind can scarcely be realized by those who have not experienced the like conditions. On the return journey, after waiting several days in the vicinity of a food depôt 67½ miles from the hut, it had to be abandoned, for drifting snow obscured everything. With but two days' supply of food left they pushed on to reach the coast, trudging onwards hour after hour in clouds of drifting snow. Fortunately before it was too late Aladdin's Cave, 5½ miles from the hut, was reached.

Hodgeman and Whetter with Bickerton formed the western party. The air-tractor sledge was told off to assist them. Unfortunately, after

reaching a point about 2000 feet up, some 10 miles south of the hut, several of its pistons broke and it had to be abandoned. A few days previously a successful trip on to the plateau and back had been made, leaving no doubt but that under different conditions, and with slight modifications, an air-tractor would prove quite valuable. The western journey was conducted for the most part at an elevation of about 4000 feet, and proved very dreary. Wind and drift were the rule, notwithstanding the fact that it was then the height of summer. The average wind velocity for the period of the whole journey, as calculated from the daily records, was 34 miles per hour. They passed over the highlands of the Adelie Land seen by D'Urville, coming close to the coast in lat. 66° 33′ S., long. 138° E., where they saw frozen sea to the west. One of the points of special interest connected with this journey was the finding of a piece of rock * a pound or two in weight lying on the surface of the inland ice-sheet far from any nunataks.

Captain Davis sailed from Hobart to the relief of the Antarctic wintering stations on December 26, 1912. Heavy weather was met going south, but nevertheless a number of soundings were secured. Commonwealth bay was reached on January 12. At that date some of the parties had not arrived, but all with the exception of my own appeared during the following few days. When the date prescribed for return had been exceeded by a week, Davis made preliminary arrangements to leave a search party to remain for another year. McLean, Hodgeman and Hurley sledged on to the plateau on the look-out for us. Before returning they laid several depôts on the highlands southward of Winter Quarters on the chance that we might find one or other of them.

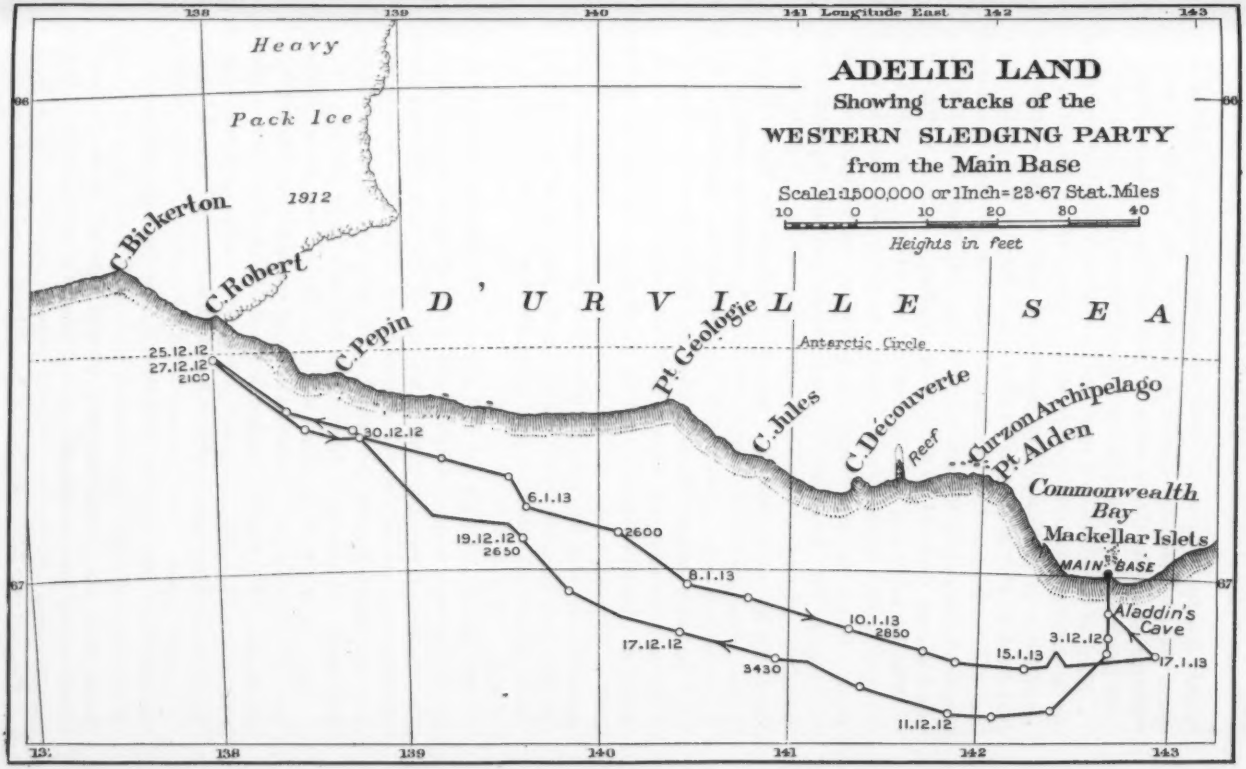
The ship's party made a search of the coast-line to the east, but arrived back at Commonwealth bay on January 31. The wind was blowing too strong to communicate with the shore party. Instead of moderating, it freshened. A heavy gale continued until the morning of February 8, when a lull set in at 10 a.m. During that time the vessel had been steaming into the heavy seas, keeping the coast in sight. Captain Davis logs: "All hands were exhausted and the vessel covered with ice, and our likelihood of being able to reach the second base this year looks doubtful." Accordingly no time was lost in taking on board all except the six who were to remain, and off they went on a 1500-mile voyage to relieve the western base. That evening when 50 miles out to sea, Hannam at the wireless receiver heard of my return to the hut. As already recorded, the wind again sprang up and prevented our relief, and they departed at 6.30 p.m. on Frebuary 9. They pushed through the pack at the north of the D'Urville sea the next day, and then shaped a course to the west. In this part of their voyage a three days' easterly gale, thick with flying snow, was experienced. During those days, under sail and steam, she

* This rock is quite unusual in appearance and may prove on examination to be a stony meteorite.

SLEDGING THROUGH THE ICE OF THE DENMAN GLACIER.

A GLACIAL LAKE IN MACQUARIE ISLAND.

163
162
Longitude East
141
140
139
138


ADELIE LAND
Showing tracks of the
WESTERN SLEDGING PARTY
from the Main Base
Scale 1:500,000 or 1 Inch = 28·67 Stat. Miles
10 0 10 20 30 40
Heights in feet
Longitude East
138
139
140
141
142
143
Heavy
Pack Ice
1912
C. Bickerton
C. Robert
C. Pepin
D ' U R V I L L E S E A
Pt. Géologie
C. Jules
C. Découverte
Reef
Curzon Archipelago
Pt. Alden
Commonwealth Bay
Mackellar Islets
MAIN BASE
Aladdin's Cave
Antarctic Circle
25.12.12
27.12.12
2100
30.12.12
6.1.13
2600
19.12.12
2650
8.1.13
10.1.13
2850
17.12.12
3430
11.12.12
3.12.12
15.1.13
17.1.13
66
67

pushed rapidly to the west. Very fortunately no bergs fell foul of their path. It was nevertheless a most anxious time. Davis wrote: "As daylight came each morning we could feel thankful that another night (which then lasted five hours) had passed without disaster."

North of the Shackleton shelf ice-sheet the ice conditions were found to be different to those of the previous year. Great difficulties were encountered in pushing a way through. Eventually the western base was reached at 12.30 p.m. on February 23. After picking up the party and their collections final departure was effected at 9 p.m. of the same day. Steaming north, 400 miles of sea strewn with great numbers of bergs and fragments of floe ice were traversed and Hobart reached on March 15.

The ice-sheet upon which the hut of the western base was erected was uneven and much crevassed for 200 to 300 yards from the edge; beyond it became more even and less crevassed. During the construction of the living hut, Harrison one day standing upon the roof framework sighted a large island rising out of the ice-sheet to the east. An igloo was built as a magnetic observatory. Upon the completion of the hut and the commencement of a regular meteorological and magnetic programme an autumn sledging journey was commenced. Wild with Dovers, Harrison, Hoadley, Jones and Moyes set out on March 13, 1912, with the idea of reconnoitring the coastal slopes of the mainland, and there caching a supply of food for the use of more extended operations later in the year. A point 2000 feet above sea-level and 35 miles in a direct line from the hut was reached. There protracted blizzards accompanied by an unusually heavy snowfall, rendering the surface difficult to travel over, necessitated a return to the hut after caching a large supply of food.

The snow buried their hut, and a fine series of store-houses was made by driving tunnels and chambers out in all directions into the snow. The floe-ice had all broken up at the end of summer, and thenceforth until next summer no seals or penguins were to be got. Several short sledging journeys foraging for fresh meat supplies were conducted in April. The winter was marked by frequent blizzards and heavy snowfall.

On August 20, Wild, Harrison, Jones, Moyes, Dovers and Watson, assisted by three dogs (all that remained), set out on a depôt-laying journey to the east. The food was cached at a point on the Shackleton ice-sheet 84 miles out. Temperatures as low as $-47°$ Fahr. were experienced. Small nunataks and large islands were seen rising from the ice-sheet, and several rocky cliffs appeared along the coastline of the mainland. On one occasion on the return journey they camped under one of these cliffs—a sheer face of rock 400 feet high, crowned by a 200-feet cliff of ice. It was found that the inland ice-sheet pressing forward kept continually overthrusting great avalanches of ice, from one of which they had a narrow escape.

Towards the end of September, Jones, Dovers and Hoadley set out on

a month's depôt-laying journey over the sea-ice to the west. About the same time Wild, Kennedy and Watson reascended the highlands southward of their winter quarters. At the end of October and early November commenced the summer sledging journeys, one to the east, the other to the west.

For the eastern sledge journey Wild picked Watson and Kennedy for his companions, and Harrison was to accompany them to the depôt, 84 miles out, then to return by himself. The start was made on October 30. On arrival at the depôt, though the food was found, the sledge that had been left to mark the spot, standing vertically and stayed with ropes, was not recovered. The wind had carried it away. Not finding the sledge, Wild decided to take Harrison on with them, as they could not afford to give him a sledge for his return journey. At 120 miles east of their hut they met a large glacier—the Denman glacier—descending into an embayment of the coast and then pushing out through the Shackleton ice-shelf. Referring to this Watson says: "Viewed from the Shackleton ice-shelf, right to the southern horizon is seen a stream of broken upturned ice, descending by cascade after cascade, and finally by still mightier cascades, to the level of the bay. It falls 3000 feet in 15 miles. Continuing on it meets and absorbs a number of tributary flows, fills the whole bay with its maze of icy confusion and spreading fan-fashion sweeps on to the north to the horizon in wide and ever-widening billows of upturned impassable ice. It ploughs its way through the more sluggishly moving ice-shelf. At the point of conflict at the sides there are mighty pressure ridges ranging up to 400 feet in height; ice that had, as was evidenced by diatomaceous stains on it, previously been under sea-water. Sea-water was present in many of the cracks and crevasses. Although the seaward face of the shelf was over 100 miles away, the shelf had been rent to the bottom."

An attempt was made to cross this chaos of ice, but had to be relinquished. A second attempt was made some distance to the north with no better fortune. A large island 900 feet high, upon which were many rock exposures, was examined and mapped. Ascending the highlands of the mainland on the western side of the glacier, they reached the rocky peak projecting from the ice-cap at an elevation of 3280 feet above sea-level. The peak rose another 750 feet above the ice. From its summit other nunataks were seen at higher elevations to the south-east; also a long stretch of coastline with frequent rock exposures was visible to the east.

They arrived at the hut on January 6. Moyes, who had lived alone at the winter quarters for two months keeping up the routine observations, was overjoyed to find Harrison alive, for he had long since given him up as dead. On Harrison's non-appearance, Moyes had packed a sledge, and gone out by himself on a six days' journey in search of his comrade.

Jones, Hoadley, and Dovers set out on November 7 over the ice slopes

to the west. Progress was slow on account of the numerous crevasses. Most of the travelling was done at elevations of between 1000 feet and 4000 feet above sea-level. At a small rock island 420 feet in height, lying several miles off the coast of the mainland, they located an immense Emperor penguin rookery. It contained about 7000 young birds, which, on account of the heavy mortality amongst the young, argues something like 20,000 adults. They also discovered the eggs of some of the rare petrels.

After a journey of 215 miles by track (not counting relays) they reached Gaussberg, connecting with the work of the *Gauss* expedition. They reached the hut again on January 21. The rocks met with *in situ* on both these sledging journeys were crystalline schists and gneisses. The map incorporating the results of the sledging journeys from the western base shows what really good work was accomplished by Wild and his six companions, notwithstanding the fact that they had to winter under adverse conditions.

The seven of us remaining in Adelie Land for a second year had a very miserable prospect ahead. However, there was plenty of work in the routine scientific observations to keep the mind from dwelling unduly upon the raging elements without. Bage carried on the magnetic work in place of Webb. The care of about twenty sledge dogs presented to the Expedition by Amundsen, and brought down by the *Aurora* that summer, fell to Madigan.

Fortunately wireless communication was established with Macquarie island about the middle of February, and we were able to apprise the world of the happenings before even the *Aurora* herself had reached Hobart. The wireless proved a success and a boon throughout the year, though temporary stoppages, occurred, owing to unusual difficulties arising chiefly from the constant hurricane. For example, it was found difficult to keep the aerial up; difficult to hear the messages on account of the muffled roar of the wind; and often impossible to work on account of the heavy electrical discharge from the atmosphere.

Later on Jeffryes, who was not so strong in health as the others, had to be relieved, Bickerton taking his place as wireless operator, which post he continued to hold with conspicuous ability until the arrival of the relief ship. Each summer, for a period of about three months, the wireless communication was broken down on account of continuous daylight. In the matter of weather the second year proved even worse than the first, and we were very glad indeed when the summer arrived.

In November Madigan, Hodgeman, and myself set out with the dogs on a short sledging journey to the Madigan nunatak and Mount Murchison. We hoped to recover certain instruments cached the previous year. In this we were disappointed, for it was discovered that the winter snows deeply buried the surface of the previous year. Returning to winter quarters, as we descended the plateau slopes the *Aurora* was seen on the horizon steaming in towards Commonwealth bay to our relief.

Wireless communication between Macquaire island and Australia was realised in February, 1912, and continued with scarcely a break until the party was relieved in December, 1913. Throughout that time Ainsworth, every evening, forwarded a synopsis of the weather to the Commonwealth Meteorological Office in Melbourne and to Wellington. The wireless station proved a great success, a wide range being maintained. Fremantle, Port Moresby, and Suva were some of the stations spoken.

Blake made a thorough map of the island by triangulation. This map shows approximate 500-feet contours for the whole island, and in the case of the northern portion the contours are 50 feet apart. Blake has produced evidence that in not long past times the whole island has been overridden by an ice-sheet travelling from west to east. It is found to abound in glacial lakes and tarns. The older rocks met with *in situ* are all igneous; the more recent ones glacial till and later sediments.

Hamilton had in the bird and seal life a wonderfully interesting field. Hamilton and Blake constantly visited parts of the island remote from the hut, making use of several dilapidated shelters distributed along the east coast left by sealers of past times. When I found that a party of us were to remain at Adelie Land for a second year I wirelessed the Macquarie island party to the effect, that it was desirable that they should remain on another year in order to keep in touch with us.

On account of shortage of funds the *Aurora* was laid up during the winter of 1913, and we were depending upon a small sealer to take stores to our party at Macquarie island. July proved an unusually stormy month, however, and the vessel after being long overdue eventually arrived in New Zealand in a damaged condition, without ever reaching the island. By that time our men were living almost exclusively on sea-elephant meat. Fortunately the New Zealand Government promptly sent a steamer, the *Tutanekai*, to their aid. Sawyer, who required medical attention, returned at that time to New Zealand.

On December 2, the *Aurora* arrived, picking up Ainsworth, Blake, Sandell, and Hamilton *en route*, to relieve us in Adelie Land. With them they brought down three new men to carry on the meteorological and wireless station on account of the Commonwealth Government, by whom the station is to be maintained in the future. The result of the labours of Ainsworth and his party is that comprehensive scientific information regarding Macquarie island is now available. Besides the routine work, many new problems have arisen enriching biological, meteorological and geological literature.

Captain Davis sailed from Hobart on November, 1913. A number of soundings and several temperature series were taken *en route*, and Macquarie island reached on November 28. On December 5, the voyage was continued towards Adelie Land. There were then on board all the Macquarie island party, also Hurley and Correll as photographers and Hunter as chief biologist.

Commonwealth bay was reached on December 13. Visits were paid to outlying islets, and a considerable programme of oceanographical work and dredging on the continental shelf carried out. On December 24 a terrific hurricane accompanied by blinding snow arose. The anchors broke and dragged. Lying close in shore with dangerous reefs in the vicinity, all view of the land obscured, and the compasses almost useless, we came very near losing everything. Davis handled the ship in a masterly way, and after several days' plunging about in such weather the conditions improved. Part of the bulwarks was carried away and the motor launch lost.

Steaming westwards a new addition was made to the western extremity of Adelie Land. The ice conditions were worse than on either of the previous voyages. Soundings and deep-sea dredgings were made regularly. Before a passage was effected into the Davis sea the ship had to steam west of the ninetieth meridian.

Oceanography and an examination of the Shackleton ice-shelf occupied us until February 7, when the pack was finally left behind. On the return journey a line of soundings was secured, completing a section of the ocean floor between Western Australia and Queen Mary Land. Adelaide was reached on February 26, 1914.

Any success that this expedition has attained is owing to the whole-hearted and unselfish way in which every member applied himself with no thought of gain other than deserved credit to the success and advantage of the whole. I cannot say too much for Captain J. K. Davis for his admirable conduct as second in command, and his masterly handling of the vessel.

Frank Wild, leader of the Western party, and George F. Ainsworth, leader of the Macquarie island party, won the sincere regard of the members of their respective parties and the admiration of every one for the splendid way in which they executed the difficult tasks entrusted to them. With a unanimity of endeavour much can be done.

SUMMARY OF SCIENTIFIC OPERATIONS.

1. Terrestrial Magnetism.

A. *Field Work.*

(*a*) Dip determinations—at Macquarie island, on the eastern and southern journeys from the main Antarctic base, and on a short journey from the western Antarctic base.

(*b*) Declinations by theodolite observations—made at Macquarie island and at intervals on all sledging journeys in the Antarctic.

(*c*) Rough observations made daily on the ship.

B. *Station Work.*

(*a*) Regular magnetograph records were kept at the main Antarctic base for a period of eighteen months. A system of term days for quick runs was also followed; Melbourne, Christchurch, and other stations

co-operating. In connection with the magnetograph work, Webb conducted regular absolute observations throughout the year. His work was admirably done in the face of remarkable difficulties in the matter of weather.

(*b*) At the western Antarctic base Kennedy kept term days through the winter, using a magnetometer and dip circle.

Biology.

1. *Station Collections.*

(*a*) At Macquarie island, Hamilton worked for two years amongst a rich fauna. The forms discovered are not merely those of oceanic types; for instance, amongst other things a new indigenous finch has been discovered.

(*b*) At the main base, Hunter, assisted by Laseron, secured a large collection notwithstanding the obvious disadvantage of bad weather. Dredgings down to 50 fathoms were made during the winter. The eggs of practically all the flying birds known on Antarctic shores were got, including those of the silver-grey petrel and of the Antarctic petrel, not before known; also a bird and its eggs of an unrecorded species resembling a *Prion Banksii*.

(*c*) At the western base, the eggs of the Antarctic and other petrels were got, and a large rookery of Emperor penguins located. Harrison did a little marine work from the floe, working with inadequate gear in 250 fathoms of water. In this way he succeeded in trapping some interesting fish.

2. *Ship Collections.*

(*a*) A collection made by Mr. Waite on the first sub-Antarctic cruise.

(*b*) A collection made by Prof. Flynn on the second sub-Antarctic cruise.

(*c*) A collection made by Hunter, assisted by Hamilton, in Antarctic waters during the summer of 1913–14. This comprises a number of deep-sea dredgings working down to 1800 fathoms, also regular tow-nettings, frequently serial, to depths of 200 fathoms. Six specimens of the rare Ross seal were secured.

Geology.

(*a*) A geological examination of Macquarie island by Blake. The older rocks were found to be all igneous. The island has been overridden comparatively recently by an ice-sheet travelling from the west.

(*b*) Geological collections at the main base. In Adelie Land the rock outcrops are metamorphosed sediments and igneous rocks. In King George Land there is a formation similar to the Beacon sandstones and dolerites of the Ross sea. Carbonaceous shales and coaly strata are associated with it.

(*c*) Stillwell collected a fine range of minerals and rocks from the terminal moraine at winter quarters. Amongst them is abundance of red sandstone, suggesting that the Beacon sandstone formation extends also throughout Adelie Land, but is hidden by the ice-cap.

(*d*) Collections by Watson and Hoadley at the western base. Again gneiss and schists are the dominant features.

(*e*) A collection of erratics brought up by the dredge in Antarctic waters.

GLACIOLOGY.

(*a*) Observations on the pack ice.
(*b*) Observations of the inland ice made on sledging journeys.
(*c*) Observations on the coastal glaciers, tongues, and shelf-ice.

METEOROLOGY.

(*a*) Two years' observations at Macquarie island by Ainsworth.
(*b*) Two years' observations at Adelie Land by Madigan.
(*c*) A year's observations at Queen Mary Land by Moyes.
(*d*) Ship's observations on each of the voyages by Gray.
(*e*) Observations on sledging journeys.

BACTERIOLOGY.

In Adelie Land Dr. McLean carried out many months of steady work.

TIDES.

Self-recording instruments were run at Macquarie island by Ainsworth, and at Adelie Land by Bage.

WIRELESS AND AURORAL OBSERVATIONS.

Very close watch was kept upon auroral phenomena with interesting results, especially in their relation to the permeability of the æther to wireless waves.

GEOGRAPHICAL.

(1) The successful navigation by the ship of the Antarctic pack ice in a fresh sphere of action, where the conditions were practically unknown. This resulted in the discovery of new lands and islands.

(2) Journeys have been made over the sea-ice and the continental plateau in regions never before sledged over. At the main base journeys aggregating 2400 miles were made, and at the western base journeys of 800 miles. These figures do not include depôt journeys, supporting parties, or relay work. The land has been followed through 33° of longitude, 27° of which were covered by sledging parties.

(3) The fixing of a fundamental meridian in Adelie Land, using wireless telegraphy.

(4) By soundings the continental slope, and in most cases the shelf itself, has been indicated through 55° of longitude.

(5) The mapping of Macquarie island.

The PRESIDENT (before the paper): We are here to-night to welcome the return to this country of the members of one of the most remarkable expeditions that has ever sailed into the Polar regions, an expedition remarkable for the scientific results which it has brought back, some of which Dr. Mawson will indicate to you in outline to-night, and still more remarkable for the extraordinary fortitude under the most difficult circumstances that man can conceive which was displayed by its members.

Before I say more of Dr. Mawson and his expedition I would venture a few remarks on the general problems of the Antarctic, remarks that seem appropriate at this moment when so many expeditions for the further exploration of that region are planned and brought before the Society and the public. If

you look at maps first of the North Pole and then of the South Pole, I think you must be struck by the strange difference. In the north we see large spaces of open sea, but if we turn to the south we find a continent filling the entire space within the Antarctic circle, and stretching out, shaped like a pear, with its thin end towards South America and the Andes. Well, even science, the highest science, is human, and looks for some objective, a tangible objective, and the scientific explorer naturally found that in the South Pole. This passion for the Pole has had one rather singular result—it has narrowed the field of exploration. Exploring parties naturally went to that bite in the pear, the Ross sea, whence there was the nearest access to the South Pole. We have, therefore, had four parties—Scott's two parties, Shackleton's party, and finally Amundsen's party—going over closely converging, if not identical routes. Now that spell of the Pole has been broken, and the area within the Antarctic circle lies as an open field to the future explorer. There are two ways in which it may be attacked. You may attempt to reach its centre from very different quarters. We have Sir Ernest Shackleton, who proposes to reach it from the opposite quarter from that which Scott did, from the Weddell sea. But there is another way of exploring the Antarctic continent, possibly a more arduous and certainly in some respects a more fruitful way, and that is to follow round the hypothetical outlines, for they are largely hypothetical, which we see in the map, and to survey its actual coasts. This was the task that Dr. Mawson and his comrades took up. Being Australians (when I say Australians, Dr. Mawson was born in Yorkshire, a sturdy county, but he was educated and has lived in Australia), they naturally were attracted to the land opposite them, and practically the expedition which Dr. Mawson will describe to us to-night began its work from a point near the Magnetic Pole which was about the farthest in that direction reached by Scott's comrades. From that point they have explored by sea or by land some 1400 miles of unknown coast. They have described many features unknown before, mighty glaciers streaming down from the highlands and floating out 40 miles to sea. But I am not going to anticipate the tale Dr. Mawson has to tell you—he will have plenty to occupy us with this evening. I will only add a few biographical details as to Dr. Mawson himself, and give the names of some of his colleagues. Dr. Mawson was a graduate in science in the Universities of Sydney and Adelaide (he is still on the staff of the University of Adelaide, which has given him extended leave in order to write his book). He was with Shackleton on his expedition, and he was one of those who climbed Mount Erebus, and subsequently went to the Magnetic Pole. On his return he planned this expedition. He went to the Federal Government of Australia, and to the various Governments of the Colonies, from which he received substantial help. He came to this country and got some aid from His Majesty's Government and from our own and kindred scientific societies. What he did with the money thus obtained he is going to tell us to-night.

All men of science will confirm what I say, that there has been no Antarctic expedition the results of which, geological, glaciological, or in the way of throwing light on the past history of our planet, have been richer than that of which we are going to hear an account. I am glad to say that, besides Dr. Mawson, we have here several of his colleagues. We have Captain Davis, the captain of his ship the *Aurora*; we have besides, Mr. Hodgeman, Mr. Gray, Dr. McLean, Mr. Bickerton, Mr. Wild, Mr. Madigan, and Mr. Blair. Unhappily Dr. Mawson has not been able to bring all his colleagues with him. We all deplore the death of Lieut. Ninnis and Dr. Mertz, under circumstances

the most tragical, and I am sure you will all sympathize with the father of Lieut. Ninnis, who is present with us to-night. I will now call on Dr. Mawson to deliver his lecture.

Sir ERNEST SHACKLETON (after the paper): In one word I move a vote of thanks to Dr. Mawson for his lecture. It was most interesting, and he has, I suppose one of the best set of pictures that ever came back. It was of great interest to me that Mawson and Davis, who for the first time went south on our last expedition, should have made one of the best expeditions ever carried out in the Antarctic. I just move a vote of thanks, and wish them all success in the future.

The PRESIDENT: I am sure you will all wish me to put that vote of thanks to the meeting, and that you will all respond to it most emphatically. We are told that geography has connections with every other science. We have seen in what an extraordinary way, with the aid of photography, it can throw light on zoology. One does not expect, when taken to the Antarctic Regions, to go there for the sake of seeing life; but I think to-night we have seen to the full the bird-life of the Antarctic brought before us in a most wonderfully vivid way. We owe our thanks, not only to Dr. Mawson, but to the very able photographer, or photographers, who have secured for us the pictures we have just seen. I should like to add that we wish to convey our congratulations, not only to Dr. Mawson and his comrades, but also to the Australian Commonwealth, the young nation which has sent forward an expedition which has been so successful and done so much for the progress of geography and of our knowledge of these remote and inhospitable regions.

THE LAND OF THE IBIBIOS, SOUTHERN NIGERIA.*

By P. AMAURY TALBOT.

THE Eket district lies on the Gulf of Guinea, and is roughly bounded on the west by the Kwa Ibo, and on the east by the Cross river. The geography of the region is exceedingly simple, as can be seen at once by a glance at the map. Its main features are the two great rivers above mentioned, which take their parallel course to the sea, receiving on the way all smaller affluents. Of the Kwa Ibo the chief tributaries are the Ubium and Awa; and of the Cross river the Uyaoron, Jamestown and Widenham rivers.

The land is low-lying, mostly only a few feet above sea-level, and, though undulating in the centre and north, even the highest parts rarely reach 200 feet.

Hardly a stone is to be found throughout the whole region, which has been built up almost entirely from alluvial deposits brought down by the rivers and held back by the mangrove. This, year after year, in growth or decay, ceaselessly gathers round its roots every atom of solid matter washed down by the waters, and thus gradually builds up the smiling land beyond its dark outposts. So rare are stones or rocks indeed in this part of the world that, wherever they appear, they are looked upon as something

* Royal Geographical Society, April 27, 1914. Map, p. 340.

uncanny, and therefore "Juju." The process of land formation can be clearly seen in action throughout the southern portion of the District, which consists of vast stretches of swamp, under water in the rainy season, and difficult to traverse even in the dries; since the ground has a way of sinking beneath the feet and engulfing the unwary in treacherous, unfathomable ooze.

Save for a few colonies of fisher-folk, who build frail palm-leaf huts by the shore, or pile-like dwellings, borne on arched mangrove roots, over the waters whence their livelihood is drawn, these lands are uninhabited except round the estuaries of the two great rivers. The influence of this environment of water and mangrove swamp can be clearly traced in the character and beliefs of the race. All the most powerful Jujus are connected with the sea or sacred pools and rivers, as also are the principal deities. It is, perhaps, over-fanciful to see in the character of this people, a quarter of a million strong—in their frequent treachery and senseless, cold-blooded cruelty—a reflection of their surroundings; quagmires, ever shifting, the most deadly of which, lying amid the mud flats of the Cross river, is known as Hell's Gate or Ghosts' Road, from its powers to suck down and engulf; the cold, swift, crocodile-haunted streams, which flow by the very doors; and smiling grass-stretches, to trespass upon the thin crust of which means certain death.

At the mouth of the Kwa Ibo lies the little clan of Ibenos, the only non-Ibibio people in the district. Just beyond their town, Uben Akang, lies the mouth of Stubbs creek which, with Widenham creek, separates the uninhabited part from the thickly peopled and fertile main portion.

A touch of unconscious poetry is shown in many Ibibio beliefs. They say, for instance, that sometimes when fishing in their canoes of an evening, a stranger suddenly appears out of the darkness and is found sitting quietly among them. On such nights they catch more fish than during any other in the year. The unknown presence is thought to be the ghost of some powerful and beneficent ancestor, who revisits "thus the glimpses of the moon" in order to bring good fortune to his descendants.

Eket people say that the country round Stubbs creek is very sacred, and that often, in the night time, the cries of sacrificed cows, goats, and sheep may be heard, as they pass by on their way to the spirit world; for, as with Thomas the Rhymer in the Land of Faery—

> "A' the blude that's shed on (Eket) earth
> Rins thro' the springs o' that countrie,"

till it mingles with the waves of the Gulf of Guinea, and, further out, with those of the South Atlantic ocean.

Far up the estuary of the Kwa Ibo sounds the muffled thunder of the waves. Imperceptibly the river-banks merge into stretches of perfect sand, so firm below the tide line as to show no footmarks, and strewn above with gleaming shells, fragments of coral and strange barnacles, shaped

like fossil flowers. Amid these sea-treasures meander great trails of convolvulus, purple or white, and long strands of leguminosæ, some of which bear flowers of vivid mauve, and others of clear buttercup-yellow. Hither, at low tide, come Eket and Ibeno maids. Over the long firm stretches of sand they slip ; then, casting off their robes, kneel on the edge of the foam to pray to the sea goddess—Uman Ibeno—to send them virile husbands. Hither also come young brides to ask for fruitfulness, while sterile wives roll themselves in the foam, praying that their curse may be taken away. Men, too, do not despise the aid of this West African Aphrodite, but come to plead for increased virility, or stand, with arms outstretched, begging her help in unexpected difficulty or danger. To all those, who seek her aid, the goddess ordains a sacrifice of white cocks and hens, varying in number according to the riches of the petitioner—for white are the chicks of Uman Ibeno, and the foam, which fringes her malachite waves, is as a flight of snowy birds over green bush.

The worship of Nature Forces played a prominent part in Ibeno religion, and, among these, the spirits of vegetation were held in special reverence. The Mission Church now stands on the site of the sacred grove of Ainyena, in clearing which, bones and skulls were discovered of many victims who had been bound to tree-trunks and left to be devoured by leopards and other fierce jungle folk. This grove was formerly thought so sacred that a cruel death was the doom of any woman who dared set foot within its ill-omened shades.

Though the lesser growths have fallen before the axes of converts, the presiding Genius still remains. This is the great tree Efa Ekkpo (the Ghosts' Dwelling-place), so called because it was thought that the spirits of all victims offered in sacrifice were drawn within, to dwell, without hope of freedom, so long as a single branch endured. Beneath the great tree special fetish emblems were set up, and a death penalty was inflicted upon any member of the cult who should dare to reveal the least of its secrets. A man, suspected of such a thing, was not brought to trial, lest his fears should be aroused. Secret inquiries were set on foot by the Head Priest, who, when he had satisfied himself of the culprit's guilt, merely announced " Efa Ekkpo calls for offerings. Let us go and make sacrifice." Arrived before the tree, the usual rites were begun ; but no sooner was the victim's attention engaged by some task allotted to him, than a member—chosen for the purpose—crept up from behind, and, without a word of warning, felled him to the earth with a wooden club. The body was buried as near as possible to the roots of the tree ; and none of the relatives ever learned of his fate. To all inquiries, the only answer given was, " He went into the ' bush ' and is lost. Maybe the trees have blocked his road so that he cannot find the way home again."

Behind Ibeno, the country grows wilder. From a geographical and botanical point of view, the march across the district near Stubbs creek is the most interesting that could be imagined. Paths degenerate into

STUBBS CREEK.

BRIDGE OVER UYA-ORON RIVER.

WATER-LILIES ON NEW CREEK NEAR CROSS RIVER.

THE PRIEST OF EDOGHO UKWA STANDING AT ENTRANCE TO SACRED WATER.

mere hunting tracks; but the vegetation is so rich and unstudied that, on one march alone, a new genus of leguminosæ and seven or eight new Napoleonas were discovered.

Near the junction of Widenham and Stubbs creek the bush suddenly opens out into a strange narrow belt of grass land, which extends for several miles. The presence of this oasis of herbage amid the surrounding forest forms a problem difficult to solve. So far as could be determined by casual examination, the soil seems to contain nothing different to that of other parts of the district. Chemical analysis might, however, reveal the presence of some mineral prejudicial to luxuriant growth.

To the northward the bush gradually merges into cultivated, thickly populated land. On our first journey thither, the main roads were found barred by stout fences—ostensibly in order to keep the goats and sheep from eating the young corn and yam-shoots in the farms, but which would also act as protection in inter-town warfare. These obstacles were crossed by rough stiles, but the difficulty thus placed in the way of traders, or indeed of all load-bearers, was too great to be allowed to continue.

Though there were some good route sketches of the western side, no reliable map of the district existed, and we were constantly coming upon creeks and rivers, some a quarter of a mile wide, of which no indication was given. The difficulty of administering such lands, without exact geographical knowledge, will perhaps be understood by the fact that, for some time after our arrival, reports of murders, and other serious crimes, were perpetually coming in from places the whereabouts of which could not be traced. Days, therefore, were often lost before justice could be enforced. Much time, too, was at first wasted in getting about the country, through want of knowledge of cross-creeks and other short cuts; while the unknown parts naturally served as a resort for fugitives from justice. If, indeed, geography is, as so often termed, the Mother of all the sciences, she may surely also be called the parent of good administration; for, without her guidance, almost insuperable difficulties are imposed in the path of justice.

On our first march from Ibeno, we came, after crossing long stretches of mud-flats, to the edge of water a few feet deep, where a small dug-out was waiting to carry us down a narrow channel into a creek, some 300 yards across. As the town, for which we were making, was marked on the latest map as a considerable distance from the nearest water, we were agreeably surprised, after landing on a "beach" into the mud of which the feet sank deeply at every step, to find our destination only a few yards from the bank.

Next morning we reached Okon Ekkpo (or Jamestown), on the other side of the district, at the mouth of the Cross river. Here, too, the land is low-lying, the only piece of high ground being a sandy bluff of curious formation, apparently the delta between long-dead river mouths. On the beach a small shed was to be seen, built over a collection of Juju pots and

posts, together with a perfectly preserved human skull, on which palm oil and other libations had lately been poured. This was the shrine of Abassi Esuk, the God of the Beach, and was placed there to protect canoes and nets, and ensure plentiful catches to its worshippers. On the plateau above, a great tree spread protecting arms between us and the fierce sunshine; and amid the dead leaves, piled about its roots lay several objects, so beautiful in shape and colour that they drew from us an involuntary gasp of longing. They were a torque, crown, anklets and bracelets of bronze, of fine workmanship, apparently very old, and weathered to the most perfect shades of blue and green, till they looked as if partly hewn from solid turquoise, and partly from chrysophase. Amid them lay a small flat sacrificial stone, rusty red in tone. Obviously the tree had once been regarded as of more than usual sanctity; but those who brought the offerings had long ago passed away. It transpired that the tree had been a special object of veneration, to which women, from all parts of the district, came on long pilgrimages. It was thought to have the power of granting fertility to those who performed the necessary rites, as well as to protect them in all times of danger. Young girls, too, before entering, and after leaving, the "fatting house," came to ask a blessing from the indwelling dryad, who was supposed to confer the power of attracting the hearts of wooers. So famous were the oracles given from this ground that it was named "Mpang Utong," *i.e.* The Place of Listening Ears.

On the wave-worn beach of the opposite shore, now taken over by Germany, stands the remnant of Onossi, once a thriving settlement from Atabong in the Eket district, but now little more than a group of fisher-huts, left standing when the rest was washed away. The people here believe that, after sunset of the day on which a great chief dies at Calabar, a canoe may be seen slipping through the shadows towards their town. Its coming is heralded by the sound of tom-toms, played by no mortal hands, and it is driven forward by paddles the wood of which "neither grew in syke nor ditch, nor yet in ony sheugh." Up the "big mighty creek of Onossi" passes the phantom canoe, to a "ghost town," thought to exist near the source.

Just before the Jamestown river flows out into the Cross river, the left bank of the former is broken by a small creek. The entrance to this is all but screened, so that it would probably escape notice save from those who, like ourselves, had learned of its wherebouts. Hardly had the prow of our canoe entered the narrow channel than we saw that it widens out into a little bay, the waters of which, at high tide, almost lap against the threshold of the shrine of the great Juju Ita Brinyan. This spirit is so powerful that, should one pluck a leaf and throw it upon creek or river —even on the waves of the sea itself—calling meanwhile upon the Juju, and mentioning the name of the enemy whom it is desired to harm, ebb and flow, wave or ripple, soft breeze or storm wind, will waft it on and on, till at length it is washed upon the grass-grown shore before the shrine

of Ita Brinyan. The little bay is full of leaves, golden or copper tinted, brown, or freshest green. So soon as one touches the shore—light-wafted despite its burden of hate—the Juju wakes to the message and thenceforth lies in wait, till the canoe of the man, against whom its aid was invoked, can be lured into deep water. Then the spirit overturns the rude craft, and draws down his victim into the mud and ooze of the bottom, never again to rise to the surface till life is extinct.

In olden days, while a "play" in honour of the Juju was being given, should a canoe full of peaceful traders pass along the river, or should any chance wayfarer trespass within the precincts of the "sacred bush," priest and followers gave chase, either by water or land. There was but little chance of escape for such unwitting intruders, who were nearly always captured, dragged before the fetish, and offered in sacrifice. Now that such methods of obtaining victims are no longer allowed, the Juju is said to sally forth and himself seize those unfortunate enough to pass by during the celebration of his rites. It is stated that such are easily known, because, when Ita Brinyan has thus laid hold of any man, the victim is drawn, by irresistible force, out of the bush or up from the river, and at length appears before the Juju House, vomiting blood.

On our surprise visit—the first made by any white man—the shrine was gruesome enough with its pile of skulls, about fifty in number, many of which were new brought. I am much gratified to learn that my successor, visiting it some months later, found only a half-dozen or so, all of which were old ones—a reform which shows considerable wisdom on the part of the Juju priests! Before the larger heap lay a great carved tusk, bearing, in low relief, the figure of the sacred crocodile, together with what seemed the conventionalized representation of a canoe. This juxtaposition, taken together with what was known of the method of the Juju, suggested that the spirit assumes crocodile shape for the destruction of his victims. The supposition was confirmed later by the testimony of several chiefs, among them Efa Abassi of Ibaka, who added that the form assumed by Ita Brinyan differed from that of other crocodile Jujus, in that he never appeared save in the shape of a smaller variety of crocodile, which is far more dreaded than its larger brethren, on account of the special fierceness and wildness with which it is credited.

Just before our visit, a case in which a man, Antikka Antikka by name, accusing his wife of invoking Ita Brinyan against him, had been brought up in the Native Court at Idua Oron. The jury, however, decided in the woman's favour, because they said that, had she really called upon the Juju, the spirit would have seen to it that the man should not have been alive to accuse her!

In this part of the world Jujus are divided into two main divisions, Idemm (or Ndemm) and Mbiam. The chief functions of the former would appear to be to bestow fertility and protect from evil spells, and of the

latter to wreak vengeance on an enemy. Of these last-mentioned Ita Brinyan is regarded as the strongest.

At Ikotobo, in the centre of the district, lies another famous Mbiam water, discovered, according to native testimony, by Mr. Eakin of the Kwa Ibo Mission.* One Sunday afternoon, when passing along a road, he noticed a bush path, and, on asking whither it led, was told, in the lowered voice of one imparting a secret of vast importance, "To the waters of Mbiam." To hear was to follow, and with that unselfish willingness to impart information, which we found so characteristic of him, he took the first opportunity to tell us of his discovery. It was not till a couple of months later that time could be found to go thither, but one late August morning we set out. On we went, through the town playground; then branched off, a little to the left of the turning which leads to the "Lake of Life"—the most famous beneficent Juju of the neighbourhood. Suddenly our guide made a dive into what looked all-but impenetrable bush. A thin track was soon cleared, and this we followed, along gently rising ground, until the sound of a small waterfall struck upon the ear. A little further the ground fell in a slope almost as steep as a wall, and after climbing downward for some yards, we caught our first glimpse of the magic water. When at length we had slipped and scrambled over the rich brown leaf-mould in which flowering shrub, looped liane, and dark evergreen ran riot in luxuriant life, we found ourselves on the brink, gazing out over the water, opposite the spot where the little cascade foamed and splashed down the rocky wall. For here, as in the Lake of Life, one side of the sanctuary is of rock, overhung with mosses of velvety green, sparkling with diamond spray, and curtained by sun-kissed leaves. Save for this, and a space at the eastern corner, whence a small stream flows out—its exit all but hidden beneath screening boughs—the pool is surrounded by walls of brown earth, so steep that the clinging vegetation seems ever on the point of losing hold. At the base lies the jade-coloured water as if in a sardonyx cup, inlaid with magic tracery of emerald and chrysophase. In its midst, the pool is so deep as to look almost black. This is probably the reason why it is usually spoken of as "the black and bitter water of Mbiam."

So potent is a draught from this witches' goblet, that a few drops mixed with food or drink are said to be enough to bring about the death of an enemy. Indeed, when the full rites have been observed, it is only

* Since writing the above, Mr. A. C. Douglas, a former District Commissioner, has sent the following note: "No. Mr. Whitehouse, my predecessor, originally discovered this water, and I myself was aware of it, tho' I never visited it." As the natives were unanimous in declaring that this particular 'Mbiam pool had never befo[illegible] visited by a white man, and as several other 'Mbiam waters, into at least one of which a little cascade also falls, are in the neighbourhood, I venture to think that that visited by Mr. Whitehouse is probably different to the one described in the text as discovered by Mr. Eakin.

necessary to sprinkle door-posts and lintel with the water, or pour some upon the path leading to farm or homestead, to produce a like effect. For, as the Pool of Isu Ma is sacred to the twin forces of Love and Life, so is that of Mbiam to their dread counterparts, the powers of Hate and Death.

He who would sweep another from his path, must bring an offering to the priest of the Juju, and follow him up the little stream which flows from out the pool. There, standing knee-deep in the ice-cold water, black with the shadow of the overhanging walls, he calls aloud the name of his enemy. Backward and forward it echoes, and before it dies away the priest takes up the cry and sends the doomed name across the water that the spirit who dwells in its depths may hear and cause the man's undoing. In exchange for his offerings, the suppliant receives an earthen bowl, never before used, filled with the fatal water. This he must bear away and employ as ordered.

At this spot, surely, might be found the goal of him who "sought hate's grove, in the gloomiest nook to dwell." Yet, even here, the fair flower of good-will and courtesy might be found by those who had eyes to see. For, as Mr. Eakin told us, the Head Priest of the Juju volunteered permission for us to visit this water, hitherto forbidden to all eyes save his own. Standing above the place of sacrifice and looking down to the point where the steps of vengeance-seekers must be stayed, since it is not lawful for them to gaze upon the mysteries of the sacred water itself, we listened to the words of the Priest of Mbiam. "As for you," he had said, "you are our friend, and the District Commissioner also. We know the fashion of your dealings. To you two, therefore, and to the white women who are his, the sacred places shall be free and open, but to no others may the secrets be revealed, and we beg that neither of you will ask it of us."

Many assert that gratitude is a quality unknown among these races. After this speech, no such reproach would be possible to any one who had the faintest conception as to what the voluntary surrendering of the mysteries of holy pools, shrouded in the silence of centuries, can mean to people such as these.

The man shown in the slide—Abassi Ekong of Ikot Imaw—came to complain that his wife's former husband had buried, in their path, the bottle of Mbiam water which he is holding. This, according to his belief, would bring death or barrenness on both, unless the enemy were forced to revoke the Juju.

In this neighbourhood blue clay is to be found specially suitable for making the beautiful water-pots, bowls, and funeral jars of the district, which, formed without any appliance save a broken sherd, grow under the skilful fingers of women potters into shapes unsurpassed in beauty of outline by anything African. Deposits of this blue clay may be found scattered over the district, and might prove worth investigation, since they occasionally yield objects of some interest, regarded by the natives

as "Juju." The compound of one of the principal chiefs is enriched by such a find. Many years ago, a "member" of the owner's family, famous for her skill as a potter, was digging out blue clay for her wares, when she is reported to have noticed something "shining like a little star." This she picked up, and ran to show it to the head of her house, who decided that so beautiful a thing should belong to the gods. He therefore inserted it in the head of his household Fetish, a mud figure, which from that day forward has borne a reputation for unusual sanctity, since it can see by night and day, because the cyclopean eye in the middle of its forehead "*shines in the dark.*" It is, perhaps, well not to give too definitely the locality of this "Juju," lest it should attract the attention of those for whom it would have other than geographical or anthropological interest. The existence of diamond-bearing (?) blue clay, in a region from which all trace of volcanic action is absent, forms an interesting problem.

A mile or two beyond Ikotobo lies the so-called "Lake of Life," discovered by Mr. Eakin and ourselves. A description has been published, so it is unnecessary to weary you with the details.

The slide shows the rock in which the Great Mother, Eka Abassi (Mother of God), here more usually called Abassi Isu Ma (Goddess of the Face of Love), manifests herself; but the spot is too holy for the approach of ordinary mortals, who must wait humbly afar off, for, save ourselves, the hereditary priest had been the only human being hitherto allowed to draw near. In a hole in the stone, he lays offerings, such as curls clipt from the heads of dead babes, whose parents come to plead that the feet of the little ones may soon be set once more on the road back to life, by grace of the Great Mother. Hither, too, come barren women with gifts of fish, plantains, and goats, to plead that a babe may soon be sent to bless their hearths. In the deep water of this strange pool live sacred fish, wherein dwell the souls of the ancestors of the race. So tame are these that they feed from the hand of the priest, and, should one of them be injured, calamity would fall upon the tribe, some hundred thousand souls, who regard this water as the most sacred spot on earth.

From many sides, the advantage, to natives, of ethnological study on the part of white rulers has lately been pointed out. If I might claim indulgence for a personal incident, I would venture to say that a knowledge of Anthropology, surely the favourite daughter of Geography, may also prove of the first importance to officials themselves. It was brought to my notice that great unrest was being created in the Ubium section of the Ibibios by sacrilegious souls, who had cast off native beliefs to the extent of trespassing on the sacred water and snaring the too-trusting fish to form a meal. To this an end was put by announcing that any person found guilty of interfering with totem animals would be severely punished. In gratitude, the whole Ubium people—lying midway between the Orons and Ekets—refused to join in a conspiracy, into which they

were sought to be driven by disaffected elements, who, as a means of forcing complicity, asserted that I was about to blow up, by tonite, the fish in another sacred water, the Ubium river. "Why," asked the chiefs, "should our District Commissioner protect these in one spot and destroy them in another? We will go and question him on the matter face to face." They did so, and as a result the whole plot, fomented by the false statements of one or two guilty persons, was brought to light and not only our lives saved, but widespread trouble averted.

The Ubium river flows into the Kwa Ibo just above Eket station, and, according to native testimony, was hitherto unexplored, save in its lower stretches, which, Mr. Douglas informs me, were previously visited by Mr. Whitehouse and himself. The current is swift and strong, while even at the height of the dry season the water is deep for the most part, and navigable to within a few miles of its source. Freed from snags and fallen tree-trunks—over which, during our voyage of discovery, the canoe often balanced perilously, or upon which we had to stand till a way could be cut to allow of passage—the creek should open up to trade many miles of swamp land, thickly populated and rich in oil and piassava palms. The people of this region, who at first were so timid that whole towns fled on our approach, were soon pacified. They awoke to the advantage to be gained by the opening up of their lands, and, on their own initiative, begged me to arrange for traders to come and buy their nuts, kernels, and palm oil. Owing to transport difficulties, I calculated that not more than a quarter of this rich harvest had hitherto been garnered; while the rest had rotted uselessly, or sprung up into young saplings, in many cases so close together as to crush one another out of existence.

Later on, we were fortunate enough to discover more than a score of sacred waters, one of which, Edogho Ukwa, lies only about a mile off the Eket-Oron road, the main thoroughfare of the district. The most beautiful of all was, perhaps, the Awa river, the upper reaches of which have so evil a reputation that not many are bold enough to dare its perils. At one point it widens out till it looks like a small lake. Luringly beautiful it stretched before us, its depths ringed round by vegetation so luxuriant as almost to hide the entrance to two creeks which here branch off. This enchanted water is the abode of the Juju Idemm Inyang (the River Juju). To this dread "dweller beyond the threshold" only white offerings may be brought; white cocks and hens, goats without spot or stain, and fathom on fathom of white cloth. The victims are borne alive to the place of sacrifice; there the heads are severed at a blow, and let fall into the water. Should the current bear them swiftly down-stream, those who bring the oblation rejoice exceedingly, for they say, "Our offering is accepted. Idemm Inyang is bearing it away to devour." Should the head, on the other hand, be seen to sink, slow-circling, till lost to view amid the shadowed depths, they know that their gifts have been brought

in vain. Then no other course is open but to consult a new Diviner and offer a fresh sacrifice.

Here and there, great clumps of water blooms raise their white, almond-scented heads, borne upon long stems springing from a mass of narrow crinkled leaves. The places in which they grow are said to be carefully avoided by the fish, "for beneath the shadows pythons have built their homes," from which the terrible inmates dart forth to devour rash intruders. At the planting of farms and at the "new yam" harvest they come, and overturn any canoe which may chance to pass. Some years they demand many victims, some years few; and for each canoe overturned a man is lost. He is the sacrifice demanded by the Juju, and at the price of his blood the others may go free. When a canoe capsizes, it must be left to lie on the sandy floor between the swaying lily stems; for none may raise it up again.

As we glided slowly down-stream, mapping, for the first time, the upper course of the magic river, our attention was caught, over and over again, by such sad derelicts lying below. The sight of these lost craft gave an impression, impossible to describe, as to the reality of a spirit world beneath the waters; for they lay tethered, as it were, upon faëry beaches, as though but just abandoned by, or awaiting the coming of, some weird dweller in this strange water-world. The pythons are thought to be tenanted by the spirits of wicked men. Indeed, among all Ibibios, the belief in metamorphosis and the power to send out the soul in were-form is very strong, and strange coincidences are always happening to confirm them in such ideas.

Many women say that their souls go forth and enter the great fish in the rivers. Not long ago, a man of Eket Atabong asserted that his wife, Esiet Idung by name, came to him one day, crying: "I am caught! I am caught and must die! for a fisherman has snared my soul in his trap by the water-side. Go, therefore, to the place of which I shall tell you, and release me before it is too late, for should the man come and kill my 'affinity' I must surely die." On this, in all haste, the husband took a canoe and went with his friends to the trap which his wife had described. They opened the door, and let all the fish swim out into the river. Among the others, they noticed one of great size. On their return, they found that the woman had recovered; but all believe that, had the fish been killed, she must have perished also.

So firmly is this belief in fish "affinities" held among Eket women that, when other Ibibios have had a specially good catch and carry fine specimens of smoked fish to market, the former have been known to burst into bitter tears at the sight, rocking to and fro and crying, "You have slain our kin!"

One of the most dreaded "affinities" is that of the crocodile. During the last tour, to the great joy of the inhabitants, two so-called "crocodile souls" were reported to have fallen to my rifle. The first was shot on the

NEW CREEK NEAR CROSS RIVER.

HEAP OF BROKEN CALABASHES OFFERED TO JUJU.

THE BLACK AND BITTER WATER OF MBIAM.

SACRED POOL NEAR EBIGE OKKOBBOR.

beach of the Primitive Methodist Mission; and a chief, long suspected of belonging to this "affinity," died a few hours later.

The other case we have cause to remember for the rest of our lives. We had been warned to take care when in the neighbourhood of the Cross river, as a certain Juju man bore enmity against me, owing to a land palaver. He was said to be in the habit of lying, in crocodile form, by the river-side in order to drag down and devour any against whom he had a grudge. Two nights after this warning, our steward, Situ, was standing on a little pier above the water. We had finished dinner and were bidding good-bye to our guest, a French officer from Morocco. Suddenly a horrible cry rang out from the stillness. Seizing any lamp which came to hand, we tore down the steep slope; urged on by screams, high pitched and awful, evidently those of a man overtaken by dreadful terror and anguish. Just before the slip was reached, these stopped, as suddenly as they had arisen. The water beneath was flecked with patches of dull froth, as if churned, while one or two eddies were still to be seen, marking the place where the unfortunate man had been dragged under. Despite every possible effort, no trace of him was ever found. He was a splendid Yoruba, six feet two in height, and of great ability, intelligence, and refinement. For four years he had followed our fortunes, and his terrible fate, almost in touch of the hands stretched out to save him, is unforgettable.

I am happy to say that the reptile fell to my rifle on the eve of our departure from the district. It may be mentioned here that, two days before Situ's death, our third "boy" Paddy had sprung into the water, only a few yards further down, to rescue a man from drowning; though the current was running like a mill race, and he well knew the danger from crocodiles. It is a great pleasure to be able to say that the medal of the Royal Humane Society has been awarded him for this.

Fish eagles are the totems of many chiefs of the race, and bird worship plays a large part in the rites of some of the most important secret cults, such as the great Idiong Society. In the initiatory rites of this, offerings are spread out for the vultures, in which the souls of ancestors are thought to dwell, and which are regarded as the messengers of God Idiong himself.

One of our most interesting experiences last tour was the witnessing of a sacred "Bird Dance"—the first time that any Europeans have been allowed to be present at such a sight. It was preceded by a marionette "play" called Akan—also never before seen by white men. In this about a score of puppets took part. This is a very celebrated Ibibio "play," and, according to the testimony of many Awa people, was, like most of its kind, invented at Ibiaku, a few miles off. The history of the "play" was given as follows by Mr. Matthews, native clerk of Awa Court. "After 'war' between two towns," he said, "on the conclusion of peace, the vanquished side must bring a certain 'play' to perform before their conquerors. Next year, the victorious party brings another play to visit the vanquished town." No woman may know the secret of

how the dolls move and talk. Every night, for seven seasons, the "play" must be practised before it can be shown openly. Towards the close of this period, the performers come out and give notice to their fellow-townsmen, "Now we are going to play 'Akan' by daylight."

There was grim cause for careful preparation, for in this, as in everything African, Tragedy walked close upon the heels of Comedy. When the "play" is taken to another town, should a single doll chance to be let fall, so that the spectators could learn from its appearance the way it was worked, the townsfolk at once surrounded the visitors and either slew these on the spot for having revealed the secret to the women, or, more frugally minded, killed the one by whose fault the misfortune had chanced, and sold the rest into slavery.

After the garishness and coarseness of this play, we were quite unprepared for the beauty of that which was to follow. This was the so-called "Utughu" or Spider Play, stated to have been brought to these parts in quite recent times from the Ibiakus. The latter are said to have learnt it from the Ibos, among whom it is reported to have been practised from time immemorial. In teaching this "play" to the Ibibios, it was distinctly stated that the original name had been withheld, because it was not lawful to entrust this to strangers. A new one had, therefore, to be found, and that chosen was probably due to the fact that the figures carry out their strange "play" upon cords, which, seen against the sky, are not unlike the threads of a spider's web. To our minds, there could be little doubt but that we were here privileged to witness a survival of one of the ancient Bird Dances. Upon the masks of the two performers, beak-like points were clearly indicated over the forehead. Bird head-dresses were worn, and, during the course of the "play," both drew feathers from amid their robes and strewed them upon the ground. All through the play, though the ropes were plainly visible, the performance seemed independent of such external aids—while the players appeared to float, effortless as birds, against the blue. The mask of the bird-wife was painted brightest gold, touched to a new radiance by the glory of early morning sunlight. From the distance, the features, which were strangely lovely, looked as though gazing out from some Egyptian tomb. Here were the same long, almond-shaped eyes, while, save for the beak, there was no suggestion of bird traits.

Our disillusionment may be imagined when, on payment of an added "dash," the masks were brought and laid in our hands. On a nearer view, the whole glamour and beauty seemed to have disappeared and we could hardly be persuaded that these were the actual ones worn. Only, when replaced upon the heads of the performers, after these had moved away, could we see that they were, in truth, the same.

Thinking over the difference, scarce believable, save to those who had witnessed it, a memory-wave brought to mind visions of those masks worn in the dramas of old Greece. There, too, the conditions were

not unlike. Given, as here, in the open—possibly also with a background of swaying palms—may not the glamour of air and sky have lent to these masks also, when seen from a distance, a beauty and aloofness, which not only heightened the effect of the glorious text, but gave to the whole an atmosphere in which great men and women lived and acted greatly—far removed from the commonplaces of this work-a-day world?

* * * * *

Till a short time ago, among most Ibibios the birth of twins was followed by the death of both mother and babes; and it is to be feared that in hidden creeks and bush farms such cruel customs are still carried out, whenever there seems a chance of evading the vigilance of Government. Even now, the unhappy woman usually has to seek refuge in a town set apart for "twin mothers," where she undergoes "purification" for about twelve months, before being allowed to mix again with her kind. Markets are held by these outcasts, to which others may come to buy or sell; but, on the way thither, should a "twin woman" meet one not defiled like herself, she must spring into the bush, and there stay hidden until the "clean" woman has passed by. According to custom, the little ones were either flung into the forest to be devoured by leopards, offered up on the beach for vultures or crocodiles, or one killed by a blow and the other starved.

One of the saddest things about this cruel superstition is the dread with which "twin mothers" regard their own offspring. Even now, it is hard to persuade such to suckle their unfortunate babes, which are often only kept alive by the charity of natives from other lands. Such a case happened at Awa, where Mrs. Etete, a Gold Coast Christian, brought up to us two piccans with their mother, whom she had saved from death the year before. On another occasion at Oron, an uncle brought two little twin girls whom he had also rescued.

Once, in passing near Ube in the Okkobbor country, we came to a small dell crossed by a raised path, through which flowed a stream of water as if by a natural culvert. We were wondering how this had been formed, when a little group of women came along and gave the following explanation:—

"In olden days, a magic water lay between these little hills, and through this, as was the case with every holy place, no 'twin woman' might pass. Mbiam Ube was the name of the spirit of the pool, and to him the people of Ube used to bring offerings of palm wine and rum, white hens and black cocks. This was a strong Juju for the granting of prayers. One day there came a twin woman who was proud, and of a bad heart, and paid no heed to the old laws. Right through the water she walked, but it shrank away from the touch of her, and, since then, has only flowed through the earth, beneath the road, that it may no longer be polluted by the feet of such as she. To this day, no one drinks of it lest he should die; but

offerings are still made to the Juju, for fear that he might otherwise grow angry and harm our town."

It is a great pleasure to be able to state that missionary effort and the vigilance of Government have made great headway against such cruel superstitions. An account of how this was brought about among the Oron Ibibios, was given me by Chief Daniel Henshaw, Native Political Agent for Eket district—a chief of the highest type, head of his clan, and a striking example of the heights, both as to intelligence and moral worth, to which Africans are capable of reaching, when not handicapped, as in so many cases, by education along wrong lines.

Only a short abstract of his account can be given here:

"Once, in 1902," he wrote, "when passing through the bush, I heard a great noise, and, on going to see the cause, found more than a hundred women crying and shouting. They looked at me as though they had never seen a man before, and inquiries brought to light that this miserable settlement was a 'twin town,' and that its unfortunate inmates were striving to drive from their midst a new-comer, on the pretext that she was more polluted than they, in that she had *twice* born twins. The poor soul, Aruk Osio by name, pleaded that if life was already so hard there—for scarcely any food was to be had, and they were not allowed to seek water from the main springs—how much worse would be her lot, driven to live in absolute solitude, still further in the depths of the bush! Yet the others refused to take pity."

Touched by their fate, Henshaw went back and tried to induce the townsfolk to let the outcasts return; but all rejected the idea, saying that, should such a thing be permitted, their Jujus would leave them in anger and they would die. On learning this decision, the chief went to the District Commissioner, Mr. Whitehouse, and, on receiving his approbation, called the "twin-mothers," and bade them prepare to come home. They asked, would Government protect them if they returned, otherwise the townsfolk would certainly kill them. Henshaw answered: "Government is ready to help all. The principal reason for which white men came is to save life and protect the helpless."

Should it not be enough reward for the hardships of life amid these regions, to any white administrator, that a chief of such high character and standing could give this reason for our presence in his country? To the loyalty of men such as he, white rule in Africa owes a debt too often unrealized and unacknowledged.

Surely his words are sufficient answer, to those who cast up in the teeth of Englishmen that "land greed" is the dominant reason for our African dominion. True it is that much remains to be done in the stamping out of hideous rites and customs; but what has already been effected gives ground for the utmost hope and courage; while, with the coming of the new railway and the greater opening up of the land, we may trust that progress will be still more rapid in the future.

In the presence of some here, who have so far more right than I to voice an opinion on matters geographical or anthropological, it is with the greatest diffidence that I venture to speak at all. Yet it is only natural to wish to express the gratitude which all such humble geographers must surely feel, to the great Society which, for many of us, has made possible work which, but for its kind encouragement, would probably have remained undone.

Sir THOMAS HOLDICH (Vice-President, in the Chair, before the paper): In the absence of our President, Lord Curzon, which no one regrets more than I do, I have the pleasure to reintroduce to you Mr. Talbot. I say to reintroduce, because Mr. Talbot has before addressed the Society, and he is, so to speak, an old friend. He is one of the many men who has taken up the white man's burden in Western Africa, and in so doing he is not merely taking up the administrative burden, but he has concerned himself with the aspects of the country. He has contributed more than once, not only to the records of its ethnology, but to its natural history, its botany, and its entomology. We could have no one, I think, to address us to-night on the particular subject of his paper, which concerns a tribe of Southern Nigeria living near the coast, who could be quoted as a final authority more certainly than Mr. Talbot.

Sir CLAUDE MACDONALD (after the paper): In the first place, I wish to thank Mr. Talbot for the delightful and poetical manner in which he has described an interesting country, of which I had some slight knowledge twenty-five years ago. I was sent out by the Foreign Office to organize an administration in what was then called the Oil Rivers, now Southern Nigeria, with a staff which numbered twelve. We had in the first instance to "clear the bush," and I can only say that those twelve "pioneers" worked as hard as men ever worked. Before twelve months were over four of them had fallen victims to the deadly climate, for in those days that part of West Africa was known as the "Land of Death," the malarial mosquito not having been discovered. I remember well, with the late Sir Ralph Moore, landing at Old Calabar, and with a sinking heart looking at my "official residence," a dilapidated wooden house with a tin roof, surrounded, up to the very front door, with thick jungle, a truly dismal abode. It took many weary months to clear this jungle, but before I left the West Coast in 1895 the clearing had been transformed into a beautiful park, dotted with fine buildings, and it is now, I understand, one of the show places of West Africa. Of my original staff, the one who was appointed by me as Commissioner to the district about which Mr. Talbot has spoken to us this evening, bears a name which is familiar to you all for the fearless manner in which he has tackled various questions of cruelty to natives in the Congo and at Putomayo. I am referring to Roger Casement (now Sir Roger), who was the first white man to penetrate these regions. We have here to-night Sir Harry Johnston, a member of the Council of the Royal Geographical Society, whose name is most honourably known wherever the name of Africa is mentioned. He, if I mistake not, for some time occupied that particularly dismal house with the tin roof which I have mentioned.

With your permission, I should like to tell you of a little incident which took place in this same Quo-Ibo district eighteen years ago. A young relative of mine, who is now Commissioner of the Calabar district, was sent by the then Acting Consul-General, also one of my original staff, now Sir H. Galway, recently

appointed Governor of South Australia, to establish what was known as a "native political agent" in the district. This official had a most beautiful uniform, and his cap had an imposing gold band with the Royal arms in front. My relative, who is here to-night, but is so modest that he will not allow me to mention his name, went there, as I have said, to establish this man at his post. Having done so, he was about to return, when he heard that a human sacrifice had taken place in the neighbourhood in order to propitiate the "jujus" for the visit of the white man. In telling me the story this evening he said, "I had just come out to the coast, and it seemed impossible to return to the chief without investigating the matter. So off I went, with an escort of one soldier and a young planter friend. Eventually we found the human sacrifice, headless and still warm. I assembled the inhabitants of the neighbouring village with their chief, and we sat down to a 'palaver.' I do not know what happened, but suddenly we were attacked from all sides. We defended ourselves as best we could, and a fierce fight ensued. We were, of course, greatly outnumbered, and were having a very bad time of it, when suddenly a friendly chief appeared, and with difficulty rescued us. We were both in hospital for some weeks afterwards, but the people who had committed the human sacrifice were caught and punished." I have since ascertained that my friend was three months in hospital with both legs in plaster of Paris, and went on crutches for eighteen months afterwards. Here were these two young Englishmen sticking up for the honour of their country and that justice might be done, with their backs to the wall fighting for all they were worth. These are little incidents which happen in the making of empire, but are not generally known. Our friend, the native political agent, who also took a gallant part in the fight, appeared at the end absolutely in the state that Adam was before the Fall, for his beautiful uniform had been torn off him. He had managed, however, to rescue the Royal arms badge, which was all he had, and which he reverently carried on the top of his head.

I beg again to thank Mr. Talbot for his interesting and entertaining paper

Sir Harry Johnston: It is really difficult to comment on this interesting paper to-night without straying beyond the field of what may be thought pure geography. But I have always looked upon this great Society, as Mr. Talbot has said, as being, in a sense, the mother of most other scientific societies. So indifferent are we in this capital of the greatest empire that ever was to the most important of all sciences, the Science of Man, that I doubt whether you could have got together such a large audience if this meeting had been held under purely anthropological auspices. The Royal Geographical Society has often to do work that should properly belong to other sections of scientific research. To-night it has given us the opportunity of taking up that side of physical geography which more properly belongs to the domain of anthropology, though Mr. Talbot has given us in his slides a great deal more geography than I thought we were going to get.

I feel, also, that this paper might have been addressed to a missionary society on a very broad basis. I only put in these apologies because I am afraid the comments I am about to make may seem not to be purely geographical. But let us suppose that geography also covers the great missionary enterprises —those enterprises which have added so largely to geographical knowledge—and try to realize the practical value of mission work, where, as in Southern Nigeria, it is doing so much to rid a barbarous country of the terrors of juju and other wrong expressions of religious feeling. I can recall an even earlier state of affairs in this region than that described by Sir Claude Macdonald. I first saw this country in the year 1882, and I remember then landing at Bonny, and

realizing what a supreme drawback to happiness and industrial development was this far-spread belief in "juju" and fetish, especially when it took the form of sacred animals. At that date it was difficult to walk along the streets of Bonny on account of the huge monitor lizards, which, being regarded as sacred, had long lost any fear of man, and positively obstructed one's path. They were about 6 feet long, or longer, and had whip-like tails which they never hesitated to use if at all out of temper, and if by chance you trod on a tail there *was* a row! Very often it was with difficulty that the lives of European seamen were saved from native fury if the national fetish was slighted or injured. Then I remember at a later date, when I was out there as acting Consul, the embodiment of a god at Brass was the python. Great fat pythons used to lie out in the centre of the streets in the great commercial settlement called Brass; and it was there that I really grew so irritable with the constant obstructions placed in my plans of reform by fetish and juju that when I found some of the more intelligent chiefs tottering, as it were, on the verge of accepting Christianity, I gave the final shove which sent them into the fold of the Church. The effect on native life in the early part of 1888 was extraordinary. The pythons and monitors and crocodiles were killed in all directions, and no harm followed. The growth of the native Church was almost unprecedented. The affairs of the Church were administered by native administrators; but, unhappily, there came a great disappointment after this ingathering, because a question of doctrine arising between two sects of Christians in the hinterland, a furious battle followed. The victors feasted so openly on the bodies of the slain—and consequently the unorthodox—that the Foreign Office was forced to take some notice of the incident. I, being at home, was asked by the Foreign Office for my opinion, and suggested that the Church Missionary Society should be consulted. They were represented by the celebrated philologist, Robert Needham Cust, and he telegraphed out on behalf of this Society to the native Archdeacon to inquire what punishment should be inflicted on these cannibals of the Brass hinterland. He replied, "Suspension from all Church privileges." However, the Foreign Office took a different and rather sterner view. I think Sir John Kirk was sent out to report, but the incident precipitated the eventual appointment of Sir Claude Macdonald. I also recall to-night other incidents of my own sojourn in the regions described by Mr. Talbot, most of which I explored in a large house-canoe. During the three years between 1885 and 1888 I fully realized the terrors inspired by native religious beliefs, and the extent to which those beliefs have withstood progress in Africa, and have added difficulties over and over again to the sufficiently terrible obstacles which Nature has placed in man's path in the Dark Continent. At the same time I quite agree that it is our first business, our most important duty, to be thoroughly acquainted with all native beliefs, in order that by understanding them we may get better to understand the mental composition and motives of the people. We are also better able to see how many of these ancient ideas may be woven into the ethics of the civilized state. The more we inquire into those involved and intricate religions of West Africa, especially in the whole region of the Niger, the more we come irresistibly to the conclusion that they are founded (at any rate, that is my belief) on ideas which have travelled all the way from Egypt or from the southern Mediterranean shores. I sincerely hope that the work of Mr. Talbot—which is not only a remarkable work geographically, but is really noteworthy in its contribution towards the right understanding of the ethnology of Southern Nigeria—I do hope that this work will be regarded as important by the country and the office whom he serves out there, and that

he and others of his colleagues in that region may be encouraged to pursue a like course, and thus add all they possibly can to our geographical and ethnological knowledge.

Sir J. G. Frazer: Mr. Talbot has collected much valuable information concerning the beliefs and customs of the natives who are committed to his charge. He has done this, I believe, with a double object, a scientific and a practical. The scientific interest of such inquiries is great, for the study of the ideas and institutions of savage and barbarous races throws great light on the early history of mankind in general, including the civilized nations of the world, since it is practically certain that all civilization has been evolved out of savagery. Hence, in studying and recording the laws and customs, the religion and superstition of the tribes of Southern Nigeria, Mr. Talbot is making a valuable contribution to the history of human progress in general. But such studies have not merely a scientific interest; they are of the utmost practical importance to Government officials who are called on to rule and administer justice among uncivilized people, since without an accurate knowledge of their customs and beliefs it is impossible to govern them justly and in a manner which will content them. The want of such knowledge is the fruitful cause of endless misunderstandings between white rulers and native subjects; and these misunderstandings may and often do lead to disastrous consequences, to grievous discontent on the side of the natives, which in its turn may culminate in murder, rebellion, and war. Those of us who have made a study of primitive races have long endeavoured to inculcate on the Government the extreme practical importance of that study for all officials who are charged with the administration of savage and barbarous peoples; and I am happy to say that the British Government is awaking to the duty and necessity of requiring its agents to make themselves acquainted with the habits and customs, the ideas and beliefs of the tribes they are called upon to rule. Mr. Talbot is one of the few British administrators who is well aware of the practical value of that knowledge, and who has set himself systematically to acquire it. In his researches he has been most ably seconded by his brave and devoted wife, who has collected from the native women information such as probably none but a woman could have succeeded in eliciting. Together, Mr. and Mrs. Talbot present a splendid example of what a district commissioner and his wife should be among savages. They are about to return to the scene of their labours, and not of their labours only, but of their hardships and dangers. I am sure that we all join in wishing them unbroken success in that far country, that they may continue to uphold the honour and reputation of British rule among these strange races, that they may reap another rich harvest of scientific knowledge, geographical, anthropological, and botanical, and that they may in due time return safe and sound to their friends in England.

Prof. A. Keith: The hour is late, and what I have to say I will say briefly. It is not only to geography that Mr. Talbot has rendered great services, the same may be said of other subjects, not only to botany and zoology, but to my own special branch, physical anthropology and the knowledge of the natives of Africa. He has given me and brought home information which gives us some fairly accurate idea of the nature and relationships of the people among whom he has worked. I only hope that his labours may not only be appreciated by the public, but by the Government whom he serves.

Dr. Rendle: Some years ago I had the pleasure of bearing testimony to the excellent botanical work in the Oban district by Mrs. Talbot and her sister, who sent to the Natural History Museum a wonderful collection of plants. Of course we expected something good from that district, lying as it does close to the

Cameroons: we knew from the plants which the Germans had collected that there were many good things. Our expectations were realized, and we were able to publish a very interesting account of the collection; but when I heard from Mrs. Talbot that they were going to a strip of alluvial land along the sea, I thought, we shall not get very much from there. But I reckoned without the enthusiasm and energy of Mrs. Talbot and her sister. They have sent us a very interesting collection, containing a large number of novelties. I may mention the genus *Napoleona*, which belongs to the myrtle family. Before the Talbots went to the Oban district, seven species were known, their work in that district doubled the number, and they have sent as many more from Eket. It is of very great importance that these plants should be collected. Sir Claude Macdonald and Sir Harry Johnston have referred to the way in which the district commissioners cut down and clear the bush. We should not wish to hinder the march of civilization; but as the country is cultivated and drained a good many plants will be exterminated, and it is of extreme importance, from a botanical point of view, that before that happens we should have as complete as possible a record of the vegetation. I sincerely hope that Mrs. Talbot and her sister will accompany Mr. Talbot again, and will continue to keep the health, strength, and energy which they have used to such good purpose on their previous expeditions.

Sir THOMAS HOLDICH: Before asking you to join in a cordial vote of thanks to Mr. Talbot for his wholly admirable lecture, there is one point I should like to make, and it is this, As the world of geographical research gets narrower and narrower from day to day, it is all the more important that attention should be concentrated on the human element in geography. The present world has ample evidence everywhere of a long past world, and it is highly necessary that we in these days should spend a little of our scientific efforts in careful study of the manners and customs of the people who now exist but who ere long will join that great army of historic and pre-historic peoples who have passed away into the great beyond, leaving no contemporary record of their existence. Not that the people of whom Mr. Talbot has been speaking are likely to pass quickly away. They belong to the great negro race who are multiplying wherever they have settled on the face of the Earth; but although they are not decreasing in numbers, their manners and habits are changing rapidly. We have heard what may happen in the course of a comparatively few years, due to the efforts of missionaries and others who are more or less concerned with the civilizing of these races. In a century or two hence they will probably be a different people. For my own part I think that it is almost more important for us in these days to study the disposition and the habits and environment of the remote tribes, people with whom we now live, than it is to spend money and increasing efforts in outlining the uncertain coasts of a dead Antarctic continent, or even in joining in a race across that continent for the mere purpose of saying that we are first over. I do not mean to say for an instant that we, as a Geographical Society, are not concerned in researches in the Arctic or Antarctic regions, although nothing, perhaps, is to be learned much beyond the shape and the superficial conditions of the exceedingly disagreeable regions which men encounter in these parts; but I do think that in course of time when new races inhabit the earth, and when, perhaps, the world may be a world of white civilized men (or may not), the future philosopher and scientist, whether he be white or black, will not thank us if we sacrifice our opportunities for recording what exists here and now, but which is passing away and will never come back, for the sake of making discoveries in uninhabited lands which we know will be anchored fast for all time. Now it only remains for me to ask you in the usual way to express your thanks to Mr.

Talbot and also to Mrs. Talbot (who, I believe is greatly responsible for the artistic effects you have seen on the screen) for the entertainment they have given us to-night.

REVIEWS.

EUROPE.

An Early Alpinist.

'Pater Placidus a Spescha, sein Leben und seine Schriften.' Herausgegeben von Prof. Fried. Pieth und Prof. P. Karl Hager. Bern: Benteli A.-G. 1913. Pp. cxiii. and 516. 2 *portraits*, 22 *plates*, and 15 *text figures*. *Price* 16*s*.

This handsome volume is issued under the auspices of the Grisons Societies of Naturalists and Historic-Antiquarians and the Rhætic section of the Swiss Alpine Club, and contains contributions from Prof. Pieth of Chur, Prof. Hager of Disentis and Herr Maurus Carnot of the latter town. It is a worthy tribute to their countryman, Placidus a Spescha, who was the son of a small yeoman, born in 1752 at Truns, a village of the Vorder Rhein valley. As a boy he was devoted to scrambling among the rocks, and to natural history, and it was probably the desire of learning which drew him to the monastic life. He completed his education at Chur, where his novitiate began in 1774, and eight years later he became a member of the noted Abbey of Disentis, 7 miles from his birthplace, where he soon began to explore the mountains and to form collections of minerals and plants. His talents and sound judgment gradually gave him considerable influence in the society, though not without the dislike of the meaner members. Life, however, went on the whole happily till the closing years of the century, when the Alps became the battlefield of French, Austrian and Russian armies. In the early spring of 1799 the first of these invaded this part of the Grisons, and exacted a large sum from the abbey. Spescha was sent, as his liberal opinions made him least obnoxious to those missionaries of fraternity, in the hope of obtaining a reduction of the demands; in this he was successful, but he sacrificed his collection to aid in making up the money. But more was to come. While Spescha was away on another occasion, the people rose against their oppressors, and he returned to find the abbey a heap of smoking ruins, and his manuscripts destroyed, with all the fruits of nearly twenty years' labour. Nor was that all. When the Austrians expelled the French, Spescha became a suspect, was deported to Innsbruck, and there interned in a convent. Here, however, he seems to have passed his time happily, but after his return to Disentis he continued to be out of favour and was generally away from the convent, working as a chaplain in the neighbouring parishes. Not disheartened by his loss, he was indefatigable in exploring the mountains within reach, collecting specimens, accumulating notes, and writing disquisitions, till at last, to use his own words, "the old barrack collapsed," and he died August 14, 1833.

Practically none of Spescha's literary work was published in his lifetime, but he left much in manuscript. Some of this was unfortunately burnt after his death, but the greater part has been carefully preserved, either in the Cantonal Library at Chur or in Disentis. In all (some being short) these are eighty-two in number. Of late years, as the President of our Society has already stated, a

few have been printed,* and twenty appear in the present volume with essays by the editors. They form four groups, the first of them being a history of the Abbey of Disentis from its foundation in 613 to the beginning of the nineteenth century. This gives a very full account of the troubles and sufferings at the end of the eighteenth century, to which we have already referred, and has a special value as the work of a man who, though he had suffered personally, was not a violent partisan. The next group deals with the industries and regulations of the district, which will be useful as a record of an era which has now passed away. The third group shows Spescha as an explorer of the Alps, for it contains accounts of his many journeys and mountain ascents, and gives a picture of that neighbourhood when the tourist was unknown. Spescha ascended, some for the first time, about nine peaks over 10,000 feet, and made six attempts to conquer the Piz Russein (11,889 feet), the culminating point of the Tödi mass, the last of them, in his seventy-second year; but, though he succeeded in climbing two of its attendant peaks, he was defeated in this, chiefly owing to the want of a fit companion. All these accounts show his power of close observation, his skill, and his courage, and they are valuable for their pictures of a pre-Alpine club Switzerland. We also find an essay on the climate of the Alps at the end of the eighteenth and the beginning of the nineteenth century, as well as a most interesting account of avalanches and other disasters from 1749 to 1818. In another essay Spescha deals with mountain climbing, and gives advice about food, outfit, and precautions, while in others he gives an account of experiences in the Tirol.

The editors have made the preparation of this book for the press a labour of love. Besides the essays already mentioned, they have enriched it with many useful notes and well-chosen illustrations, among which are two portraits of the author of the manuscripts. These depict a vigorous, thick-set man, with a homely face, which expresses courage, sound common sense, and a pensive but humorous disposition. They have made the book a worthy monument to a native of the Grisons, who, though without the advantages of De Saussure, deserves a high place among naturalists and scientific geographers.

T. G. Bonney.

'The Place-Names of Nottinghamshire.' By Heinrich Mutschmann. (Cambridge University Press. 1913. Pp. xv, 179. 7*s.* 6*d.*) This forms a volume in the Cambridge Archæological and Ethnological Series. Workers in the field of English place-names undertake a difficult task, the value of which is none too widely recognized. Nottinghamshire is an interesting county in this respect: though the bulk of the names are of Anglo-Saxon origin, there is a Scandinavian element which the author believes, if marked on a map, would show a noteworthy distribution, indicating that the invaders had peacefully settled "in the marshy, sandy, unattractive regions left vacant by the Anglo-Saxons." This autographical experiment deserves trial, not only for this, but for other counties whose place-names have been authoritatively worked out.

'Umbria Past and Present.' By Mary Lovett Cameron. (London: Sidgwick & Jackson. 1913. 6*s. net.*) The story of Umbria is concisely but adequately dealt with in the first chapter of this volume. The writer is in

* In the volumes of the Swiss Alpine Club, and in 1861, Prof. Theobald devoted a chapter to the author and his writings in his work on the "Bünder Oberland." On this was founded an excellent article by Mr. D. W. Freshfield in the *Alpine Journal*, vol. 10 (1882), page 289.

sympathy with her subject and inspires her reader with the same. She takes us through one town after another—Spoleto, Gubbio, and ten others, describing their buildings, some of which are curious blends of ancient Umbrian and comparatively modern architecture. Then follow descriptions of various fairs and religious festivals, and the industries, customs, and mode of life of the Umbrians who have retained so many old-world habits and faiths. Assisi, the mystic city, has, quite deservedly, a chapter to itself. The reproductions of Benvenuto's architectural photographs are most interesting, so are the delightful drawings by Venanzi.

'Handbook of Dalmatia.' By M. Seifert. (Vienna: A. Hartleben. Pp. xvi., 187. *Maps, Plans, and Illustrations.* 1913.) A guide to this Austrian province was much needed, for though Baedeker, Murray and Joanne include Dalmatia in their respective guides to Austria, yet in view of the importance of this new touring field, an independent guide to the district should be welcomed. The architectural attractions of Ragusa, Spalato, the wonderful ruins of Pola and the charming scenic features of this Adriatic Riviera are fully and conscientiously described. The English translation is not quite successful, and we find such sentences as "the visit requests an hour's time," but such literary shortcomings are of little moment in a guidebook. The practical details are very complete and ample, and the maps and plans are clear and accurate.

'The Russian Year-Book for 1914.' By H. P. Kennard, M.D. (London: Eyre and Spottiswoode. 1914. Pp. xx., 754. *Diagrams.* 10*s.* 6*d. net.*) This Year-Book (which has now reached its fourth issue) has been intelligently compiled by Dr. Howard P. Kennard, and contains most of the information one usually expects in an annual work of reference of this kind. It has evidently been planned on the lines of a British Colonial Year-book, though unfortunately the Gazetteer section is omitted. It is unfortunate that the information is not always up to date; in fact, few of the statistical details have been brought down to a later date than 1912. This is, however, the only serious shortcoming. The sections dealing with the national resources of the country—mines, agriculture, &c.—are remarkably full and informative. Tourists will find some valuable hints on the vexatious and complex passport regulations, but the section dealing with hotels is inadequate. The index is very full, but the bibliography is poor and of little value.

AFRICA.

Libya.

'The Eastern Libyans.' An Essay by Oric Bates. London: Macmillan. 1914. Pp. xxii., 298. *Illustrated.*

'Strabos Erdkunde von Libyen.' By F. Strenger (Quellen und Forschungen . . . herausgegeben von W. Sieglin). Berlin: Weidmannsche Buchhandlung. 1913. Pp. 139.

Of these two important treatises on Libya, the second is purely geographical (ancient geography), while the first is in the main an archæological essay, prefaced by a section on the modern topography, and containing also a good deal of matter regarding ethnology, climatology, and so forth, as well as what is usually called ancient geography. Both are works of compilation, but their scope, character, and value differ. Dr. Strenger works from a literary standpoint, Mr. Bates from an archæological one. The former devotes himself to *Quellen Kritik*, the text of Strabo's seventeenth book, and is content to do the

essential work preliminary to a definitive edition of that book. A critical edition of the whole text of Strabo is one of the things to be most devoutly desired at present. The manuscripts on which it rests leave it in a very corrupt and doubtful state; but nothing can be done usefully to emend it except comparative study of all other authorities for the ancient geography of the lands with which Strabo dealt. In this instance, that is to say, commentary must precede an edition of the text. That Dr. Strenger has made such a comparative study and supplied the necessary commentary to the Libyan chapters of Strabo will put all future editions in his debt.

Mr. Bates is more comprehensive but less conscious of the imperfections of his authorities. Confining himself to Eastern Libya (*i.e.* the region bounded on the east by the Nile and on the west by a line drawn south from the southernmost light of the Syrtis), he aims at summarizing all present knowledge of the country and its inhabitants with a view to elucidating Egyptian evidence for its ancient condition. So far as his descriptive chapters on geography and ethnology go, the labour and learning which have been devoted to their compilation are evident, but the authority to be attached to the statements in them is not so obvious. For one thing, it is far from clear how much of the country the author has seen for himself, and how much of the ethnological data which he uses he has had the opportunity to check. We gather that he has been in Cyrenaica, and on some parts of the coast of Marmarica. There is a suggestion that he has seen Siwah, but he does not say so explicitly; and about all other inland points, with which he deals, we feel equally uncertain. Not that he tries, for one moment, to create any false impression of autopsy, but, not realizing how great a difference in value there is between his own observation and his mere repetitions from others, he has left us in more than Herodotean perplexity. For example, take his brief notice of the Angila group of oases—is it based on anything more recent than Barth? or, again, his description of the Chad road from Tripoli—is it based on recent information or on books older than Vischer's? We doubt very much if Murzuk and Gatran can be rightly called "large towns" at the present day. This weakness re-appears in the archæological parts of the book, where the very comprehensiveness of the treatment makes the reader uneasy. Is Mr. Bates, he asks, speaking at first hand of all his material alike? Is he to be accepted as an authority equally on things hieroglyphic, Greek, Arabic? But on this point we must not insist in a *Geographical Journal*. We admire both the industry and the knowledge of Mr. Bates, but we hardly feel that he has succeeded in writing so authoritative a book on Eastern Libya, as we expected to read when this large and expensive volume came into our hands. It will be very useful as a guide to other authorities, and when those other authorities are referred to, it will no doubt often prove that Mr. Bates is right, but he will seldom save us the reference.

'The Bonds of Africa.' By Owen Letcher. (London: Long. 1913. Pp. 267. *Map and Illustrations.* 12*s.* 6*d.*) "Impressions of travel and sport"—thus the subtitle describes this work—"from Cape Town to Cairo, 1902–1912." The author has indeed ranged widely, through Rhodesia, Portuguese East Africa and Nyasaland, along the East Coast, through British East Africa, Uganda, and Egypt. Humour, excitement, and able description are all present in his well-written narrative, which is pleasantly illustrated with photographs.

'Wild Game in Zambezia.' By R. C. F. Maugham. (London: Murray. 1914. Pp. xii., 376. *Map and Illustrations.* 12*s.*) This is a simple and

exceedingly interesting narrative of sport, with the accompaniment of information about a territory of which parts are little known, that is natural to such a narrative. Some remarkable photographs of wild fauna illustrate it, and the map is well above the average. The author's views upon game preservation should command attention.

'The English People Overseas, vol. 6, South Africa, 1486–1913.' By A. Wyatt Tilby. (London: Constable. 1914. Pp. viii., 632. 7*s.* 6*d.*) "The present volume brings to a close the first part of this history of the English people overseas." It may be recalled that previous volumes carry the history of the American colonies down to 1763, of India down to 1828, of British North America down to 1867, of Britain in the Tropics down to 1910, and of Australia down to 1911. This is a very notable achievement, and the author's hope that he may continue the histories of India and of Canada, and deal with the English in the United States, will be echoed by many readers. The present volume maintains or improves the standard of its predecessors, and that is high praise. The writer deserves well of all students of the Empire, and his work should help to increase their number.

'Cairo of To-day.' By E. Reynolds-Ball. (London: Black. 1914. Pp. iv., 268. *Maps and Illustrations.* 2*s.* 6*d.*) The seventh edition of this convenient guide is brought, so far as can be judged, thoroughly up to date; rewriting has been involved in dealing with communications, etc., and the recent archæological work in Egypt receives full treatment, whereby the scope of the volume has been extended in a valuable way.

AMERICA.

The Panama Canal.

'La Nouvelle Voie Maritime: Le Canal de Panama.' By D. Bellet. Paris: Guilmoto. 1913. Pp. 330. *Map.* 5 *francs.*

'The Panama Canal.' By F. J. Haskin. London: Heinemann. 1914. Pp. xi., 385. *Maps and Illustrations.* 6*s.*

These two works on the same subject differ markedly. The French volume is the more solid and methodical; here we find first a discussion on ship canals in general, next a survey of the Isthmus of Panama with a retrospect of the early plans for a canal through it, then the French scheme, and finally the American, treated in detail. The last section of the work deals with the future economic potentialities of the canal, and cites its financial aspects. Altogether this is a comprehensive work of reference on the great undertaking from every point of view. The English (or American) work is more discursive, and in its appreciation of the magnitude of the work and of its leaders more florid. Its chief interest (though the appeal is popular and the treatment not technical) is in the organization of the labour and in the engineering work, and the chapters on the latter subject carry the authority of Colonel Goethals.

'La Géographie de Terre-Neuve.' By R. Perret. (Paris: Guilmoto. 1913. Pp. vi., 373. *Maps and Illustrations.* 10 *francs.*) This book appears to provide a case (not of an uncommon type) of an authoritative work on the geography of a British territory by an author who is not British. We have here a detailed geographical survey, in which special attention is paid to natural features and natural science, chapters being devoted to the geology, to the physical geography, the climate, vegetation and fauna, and to the Grand Banks, before the economic, colonial, and political aspects are taken up. There is a very full biblio-

graphy, and but for the characteristic absence of an index this work would be classified as a first-class book of reference.

'The Carolina Mountains.' By Margaret W. Morley. (London: Constable. 1913. Pp. ix., 397. *Map and Illustrations.*) This is a descriptive work of the kind which makes pleasant reading and presents much information of human and historical interest in no formal or methodical manner. The charm of the country with which the writer deals is brought out to the full in words and by camera and brush. Only the map fails of success.

'The Ascent of Denali (Mount McKinley).' By Dr. Hudson Stuck. (New York: Scribner. 1914. Pp. xix., 188. *Map and Illustrations.*) Reference was made to the Stuck-Karstens Expedition, which effected "the first complete ascent of the highest peak in North America," in the *Journal* for January of the present year (p. 83). The narrative and the illustrations do full justice to the beauty of the scenery encountered, to the interest and value of the journey; the difficulties of the ascent are also defined—as concerned not so much with the usual aspects of skilled mountaineering (except at one part), as with considerations of transport owing to the remoteness and size of the mountain, and the great distances involved in its approach and climbing. The descriptive passages in this book are admirable. There is some reference to the history of exploration in this locality, and the discussion of Dr. Cook's claims possesses its lamentable interest.

'Highways and Byways from the St. Lawrence to Virginia.' By Clifton Johnson. (New York: Macmillan. 1913. Pp. xi., 340. 1.50 *cents.* *Illustrations.*) The last published volume of the American Highways and Byways Series lacks perhaps, the literary finish and exact topographical knowledge of the well-known English series, but is pleasantly written and deals with a very interesting region. Mr. Johnson, for the most part, avoids towns and populous centres, and confines his rambles to the rural districts, giving us typical pictures of country life in the Adirondacks, the Catskills, and the Hudson hinterland. The physical features of the States, thus leisurely traversed, appeal less to the author than their inhabitants, and we glean little of topographical or geographical interest. In his chapter on Washington, Mr. Johnson tells a little-known fact about the origin of the name "White House." It is mortifying to learn that it is due to British vandalism. Some marauding British soldiers in the time of President Madison had attempted to set the Presidential residence on fire, and in order to obliterate the marks the President was fain to have it painted white.

AUSTRALASIA AND PACIFIC ISLANDS.

New Zealand.

'The Wilds of Maoriland.' By James Mackintosh Bell, M.A., PH.D. London: Macmillan & Co. 1914. *Maps and Illustrations. Price* 15*s.*

Dr. Bell, who was Director of the Geological Survey of New Zealand for six years, travelled extensively in the wilder parts of the islands where the Maori still pursues the ways of his fathers. He has, in this volume, some charming descriptions of "the great forests where the shrill cry of the kiwi is heard at dusk, and of the silent Alpine passes where landscapes of matchless splendour unfold themselves with the rising sun," and he also records dangerous and difficult expeditions in some of those Alpine districts which are even to-day almost unknown. Amongst these expeditions, he visited Whangeroa and the North Cape, Mayor island, Urewera and Karamea, and he has also a valuable account, which is almost a history, of the Hauraki goldfields. Alpine climbers will find

much that is interesting in his accounts of the great Douglas glacier in the Southern Alps. There is an excellent map of the glaciated region.

Besides descriptions of scenery, geological notes, and travel incidents, there are many stories of the old Maori days during which incessant warfare was carried on between the various tribes, as well as accounts of modern developments in native life.

A valuable chapter is that on the geography and climate of New Zealand, which contains a brief sketch of the main characteristics of the islands. The descriptions of the formation of the Canterbury Plains and other littoral districts is especially clear and of great importance. Not so much space as one might perhaps desire has been allowed to the difficult questions connected with glacial and volcanic history and the complex elevations and subsidences of the coast-line. Thus the author mentions that from the shade of a tree fern one may look down on the séraced and pinnacled ice of the Franz Joseph glacier, which in its lower part "passes through a forest subtropical in luxuriance," but hardly deals thoroughly with the important problem here suggested. He gives, however, a full description of the eruption of 1886, during which the famous pink and white terraces were destroyed.

It is, of course, one's own ignorance that makes such sentences as "Giant rimus, totaras, and Kahikateas rise on every side," or "long ropes of the geigei . . . or matted meshes of the mange mange," unintelligible, but one would like to know what they are, and also what is a "weka."

Many of the numerous photographs are of great geological interest, as well as being sometimes extremely pretty. One doubts if so much can be said, with confidence, of the coloured sketches. The purple-headed mountain with a bright blue river running by seems, to us at least, a little improbable.

G. F. S. E.

'Outback in Australia.' By W. K. Harris. (Letchworth: Garden City Press. 1913. Pp. x., 224. *Map and Illustrations.* 5*s.*) Considering the amount of matter and illustrations in this volume and the style of its production, it is by comparison with such books in general commendably cheap. Mr. Harris is a voluminous writer, but should find plenty of readers who will not tire of his narrative, in the course of which he has much to say on the economic state and prospects of the country through which he has travelled in New South Wales, Victoria, and South Australia.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Seismology.

'Modern Seismology.' By G. W. Walker, M.A., F.R.S. ("Monographs on Physics.") London: Longmans. 1913.

With the exception of a brief chapter on the periodicity of earthquakes, this volume is confined to one department of seismology, namely, that which deals with the theory and construction of seismographs, the records of earthquakes obtained by their means, and the light which a comparison of various records throws on the condition of the Earth's interior. The instruments described are the Milne seismograph, the Wiechert astatic pendulum, and the Galitzin seismograph. The best methods of damping the instruments, that is, of neutralizing the oscillations peculiar to the pendulums, are also given in detail. Two of the most valuable chapters are those on the interpretation of seismograms and the determination of the position of the focus. On the whole, the

volume contains a good account of the physical aspects of seismology; but it shows an imperfect acquaintance on the part of the author with the literature of the subject. If it should reach a second edition, it would be improved by the addition of an index and more frequent references, and by the correction of several errors.

GENERAL.

The Coal Supply of the World.

'The Coal Resources of the World.' An Inquiry made upon the initiative of the Executive Committee of the XIIth International Geological Congress, Canada, 1913, with the assistance of Geological Surveys and Mining Geologists of different Countries. Edited by W. McInnes, D. B. Dowling, W. W. Leach. In 3 vols., xxxix., 1266 pp. *Atlas of* 48 *Maps.*

In connection with the meeting of the International Geological Congress at Stockholm in 1910, an important work was prepared on the iron ore resources of the world; and in view of the succeeding meeting of the Congress in Canada the Organizing Committee arranged for a similar collection of evidence on the more familiar but even more important topic of the world's supply of coal. Inquiries were addressed to the heads of the Geological surveys throughout the world, and reports have been received from all coal-containing countries except Greenland, Peru, and Brazil, and from many which sadly confess that they are coalless. The reports have been edited by Messrs. McInnes, Dowling, and Leach, of the Geological Survey of Canada, and published in three large volumes and illustrated by an atlas of most valuable maps. The difficulty of correlating the estimates from so many different countries has been reduced by the nature of the preliminary inquiries. The authors of the various reports were instructed to classify their coal supplies according to both the possibility of economic mining and to the quality of the coal. The coals were to be primarily divided into two sections—firstly, coal in seams not less than one foot in thickness, and at a depth of not greater than 4000 feet; and secondly, seams of 2 feet or more in thickness, and occurring at depths from 4000 to 6000 feet. Coals were further to be classified, for the purpose of this monograph, into four qualities, based upon the ratio of the fixed carbon to the volatile matter and on the calorific power. Thus class A includes coal with a ratio of fixed carbon to volatile matter of 12 or over, and a calorific value of 14,500 to 15,000 British thermal units. This class, of course, consists of anthracitic coals. Classes B and C include the bituminous coals, which are defined as having a fixed carbon ratio varying from 1·2 to 7, and a calorific value of from 12,000 to 16,000 B.T.U.

Class D contains coals with a fixed carbon ratio of less than $2\frac{1}{2}$, and a calorific value of from 7000 to 13,000 B.T.U., and it includes the sub-bituminous and brown coals and lignites. This classification was probably the best that was practicable, but it is, perhaps, a pity that no inquiry was made as to the quantities of coking coals.

The successive reports inevitably vary in the practical value of their information, as in some the information was already easily accessible, whereas others, such as the two important reports on China, contain more original matter.

The result of this world-wide inquiry is to show that there is no immediate fear of a coal famine. The quantity of coal reported is over seven billion tons, of which nearly four billion tons is bituminous coal; and most of the reports give minimum estimates, as vast quantities, the amounts of which are at present

quite indefinable, have been necessarily excluded. In Great Britain and Ireland the reserves are estimated at 189,533 million tons, excluding brown coals; Australia has 165,572 million tons, mostly bituminous coal, in addition to incalculable but immense supplies of brown coal. Canada reports 384,000 million tons, mostly belonging to Class D. The United States has the largest known supply, viz. 3,838,657 million tons, of which about half is bituminous and nearly half belongs to Class D. China has 607,523 million tons of bituminous coal, and is also fortunate in the possession of 387,464 million tons of anthracite.

The reports illustrate the rapid growth in the known coal resources of Germany, a fact of great political importance, which is inadequately realized in this country. The geological work of recent years has shown that Germany has immense supplies of coal, which are estimated at 409,000 million tons of bituminous coal, exclusive of its large stores in Class D. Germany should, therefore, in time become entirely self-dependent for coal, with the exception of special qualities.

This valuable collection of authoritative reports must long remain the standard book of reference for the coal resources of the world.

J. W. G.

'Elementary Commercial Geography.' By Dr. H. R. Mill, revised by Fawcett Allen. (Cambridge: University Press. 1914. Pp. 215. 1*s.* 6*d.* *net.*) Mr. Allen has thoroughly revised Dr. Mill's well-known work, which was first issued in 1888. Recent statistics have been added, and the index is made more complete. Part I. treats of general facts, and Part II. is a gazetteer-like description of the countries of the world. Commercial geography, in the author's opinion, can only be really understood after the reader has learnt some physiography and some economics; surely commercial geography is the groundwork, the descriptive part of economics! A revision of an old book, especially if it be more than twenty years old, can hardly escape some defects; in this case, it may be suggested that the perspective of the treatment of various areas should have been altered, and despite Mr. Allen's care some of the facts are not brought up to date, *e.g.* those relating to the railways of New Zealand.

'A Commercial Geography of the British Isles.' By F. Mort. (Edinburgh: Oliver & Boyd. Pp. 152. *Maps.* 1*s.*) Roughly, half Mr. Mort's book is devoted to general principles and general facts, and the treatment affords an excellent illustration of the changes which have occurred in relation to the teaching of commercial geography during twenty years, and which have, in part, resulted from the pioneer work which Dr. Mill's book (noticed above) represents. Mr. Mort emphasizes coalfields and trade routes, and, despite his warning regarding memory work, provides long tabular summaries regarding the articles of trade of Britain and British ports.

'Unto the Hills.' By Douglas W. Freshfield. (London: Arnold. 1914. Pp. viii., 120.) This little volume of verse, though mainly subjective, contains sketches of landscape which may appeal to some travellers and geographers. The reader will meet with passages descriptive of Exmoor and the Sussex Downs, of Provence, Italy, the Caucasus, the Himalaya, and Burma. He will find also commemorative lines or sonnets on Mr. Donkin, killed in 1888 in the Caucasus, and on two well-known Chamounix guides.

THE MONTHLY RECORD.

EUROPE.

Distribution of House-Types in N.-W. Germany.—The study of the distribution of house-types as influenced by geographical or ethnological factors is one well worthy of being taken up by geographical students. It is of course necessary for the purpose to take account of the *older* houses, which preserve the characteristics of a bygone age before the modern spread of industrialism and increased facilities of intercommunication broke down the individuality of different districts, and which therefore represent the indigenous development of the separate types. Such houses are fast passing away in many localities, and there is need for promptitude in collecting and comparing the facts if results of value are to be obtained. The study, like that of the geography of settlements in general, has met with more attention in Germany than in most countries, and two instructive papers on the subject have appeared in the *Forschungen zur deutschen Landes- und Volkskunde* (vol. **20**, parts 4 and 6, 1913). The first, by Prof. Otto Lehmann of Altona, discusses the distribution of house-types in Dithmarschen in Schleswig-Holstein, between the mouth of the Elbe and the Eider; the second, by Dr. W. Pessler, treats of the small district of the Wilster Marsh, south-east of the former. In both districts a mixture of types occurs, no doubt due to the fact that we have to do with a borderland between different ethnological stocks. But while in Dithmarschen, according to Prof. Lehmann, the chief factor governing the distribution is the nature of the ground, no such explanation seems applicable in the smaller and more homogeneous area of the Wilster Marsh. The inland parts of Dithmarschen consist of the "Geest," an area which has been firm ground since the Diluvial period. After the melting of the ice this sent out several tongues into a shallow sea which forms the present "Marsh"; the steep escarpment of the Geest, known as the "Kleve," representing the ancient coast-line. In front of this ran (and runs) a belt of dunes (the "Donn"), which is the site of the earliest, even prehistoric, settlement. From the ancient sea rose slight elevations which were also peopled at an early date, and can still be traced in groups of houses crowded together on rising grounds. From about 1050 A.D.—the time of the great Frisian immigration, the enclosure of the marshes by dykes began, and this has constantly added to the area of habitable land. Within the political unit so constituted four types of houses may be distinguished, which are in turn described and illustrated in the paper: the South Dithmarschen house, the East Frisian house, the "Dwer" house, and the Saxon house, each showing a different arrangement of the interior, both as regards the living rooms themselves and as between these and the portion allotted to live stock. The first and third are pre-eminently houses of the marsh, being characteristic respectively of the southern and northern sections of it. The East Frisian house has invaded the reclaimed lands, and extended its influence even further; while the Saxon house was formerly the house of the "Geest," though this has shown far less conservatism than other parts of the district, and there are now many modern houses of other types. The second paper shows that within the physical unit dealt with the old "Barghus" of the marsh is now associated with a second type—the "Husmannshus"—which is the old Saxon farmhouse transplanted into the Marshland.

ASIA.

English Expedition in Sumatra.—News from the expedition to Central Sumatra undertaken by Mr. C. Boden Kloss in company with Mr. H. C. Robinson, Director of Museums in the British Federated States (*Journal*, vol. **43**, p. 694), was published in the *Gazette de Hollande* (English Section) for July 8. It is stated

that the expedition has already resulted in the collection of some interesting biological specimens from this rich tropical region. Writing from Sungei Kumbang, Korinchi, Mr. Robinson mentions that considerable collections were made at Siolag Dras, comprising some 500 birds, 100 mammals, and many insects and plants, some of the specimens being of great interest and rarity. In a second letter written from a camp on Koeinchi peak, at an altitude of 7300 feet, he states that at the height of 11,000 feet on that peak animal life hardly existed, being represented only by a black bird, probably a new species, a white-eye, known from the Dempo (a volcano to the south), and two species of bumble-bee. On May 5 Messrs. Robinson and Kloss left for the summit. The limit of vegetation was about 11,200 to 11,500 feet, though scattered seedlings of various flowering plants, and several mosses and a fern, practically persisted to the summit. At about 12,500 feet they reached the triangulation pillar of the Netherlands India Survey, and above it an almost level shelf covered with volcanic *débris*. Water was available in an adjacent gully, whilst firewood had been brought with them. All the coolies were then sent back. The weather was fine till about 2 p.m., when rain and wind and heavy mist set in, continuing till well after sunset, and during the night the temperature fell to 37° F. The crater is a roughly circular bowl, perhaps 600 to 800 yards in diameter, with steep walls in places, almost overhanging the crater-rim, which is knife-edged here and there, and continually falling in. In the absence of a reliable aneroid graduated sufficiently high, the explorers did not obtain a direct estimate of the height of Indrapura or Korinchi peak. A hypsometer reading on May 7 gave a boiling-point of 190°·45 F. as the mean of two observations, and it is thought that these data will give a height closely agreeing with that given on the Dutch maps.

New Volcanic Island.—In the course of an address on Japan delivered to the Royal Geographical Society of Australia, Mr. W. G. Vieth made mention of a new island hitherto uncharted in the Kazan-retto group (Volcano islands), an account of which, accompanied by two photographs of the island, he has now sent us. Mr. Vieth left Yokohama in the yacht *Tilikum II.* on January 24, 1914, bound for Brisbane, Australia. It was while anchoring at Point Lloyd, Bonin islands, that news was received that a Japanese resident on Naka-Iwojima (Sulphur island), the middle one of the Kazan-retto group, had just arrived there reporting the phenomenon. It was at once decided to alter the course of the *Tilikum II.*, in order to investigate the matter. When the yacht cleared Point Lloyd, a Japanese man-of-war (despatch boat) had just arrived there with orders of a like nature, but as the latter stayed a few days at Point Lloyd, Mr. Vieth's boat was the first to arrive at the scene. "At about 9 a.m. on February 14," he writes, "we sighted a cloud of thick blackish smoke rapidly shooting up from the sea in column shape. About noon we came quite close to the island, which is of circular form, about 1 mile in diameter, 600 feet high, with a crater in the centre, opening to the south-east. It is 3 miles distant in north-westerly direction from San Augustino, the southernmost of the Volcano group. All these measures are calculated only, as we did not attempt a landing, the violent eruptions at short intervals, sometimes accompanied by a rumbling noise, preventing our approaching nearer than, say, one-third of a mile. Plenty of pumice-stone was floating in the sea in patches. The island itself shows the same yellowish-grey colour, and seems to consist in bulk of the same light material. The neighbouring San Augustino is of much greater height, clothed with vegetation, and rises steeply from the sea. It is uninhabited. The new island bears no sign of vegetation as yet." It is asserted that a similar island had risen in the same spot about ten years ago, but soon disappeared again. It will be remembered that the volcanic island of Sakura-shima, in Southern

Kiushu, Japan, was in violent eruption about the same time, causing much loss of life.

AFRICA.

The Nile Flood of 1912.—The annual report by Mr. J. I. Craig on the Rains of the Nile Basin and the Nile Flood appears as Paper No. 32 of the Survey Department of Egypt. The report follows the general lines of its predecessors, but the last chapter contains a mathematical investigation into the effects of seepage, evaporation, and rainfall, calculating the losses on the White Nile between Malakal and Omdurman in the beginning of 1912. Mr. Craig believes he is pointing out for the first time that the "equation of continuity"—which expresses the fact that no water escapes reckoning as affected by real factors as evaporation, seepage, direct rainfall and flow from tributaries, and which is hardly known in English hydrography—leads to a characteristic function for the movement of a river or water channel of any sort. The flood of 1912 was late, owing to the weakness of the light rains in Abyssinia and the emptiness of the trough during the preceding low stage, but reached its maximum some three weeks before the usual date. From a study of the 1912 flood, it seems that the conditions favourable to an early flood are good, well-distributed light rains in Abyssinia, combined with a preceding low stage on the White Nile that is well above the average. Conditions affecting the flood may change so abruptly as to falsify predictions. Thus early in June a flood slightly above average was predicted, which was justified by the event only up to the middle of August, for the favourable conditions existing in May appear to have given way later. Hence it becomes essential to follow these changes, and revise early forecasts. On these lines it seems likely that useful forecasts some six weeks ahead will be possible for Wadi Halfa. A denser network of stations is desirable in Abyssinia and over the Congo basin.

AMERICA.

Ohio Valley Floods.—A discussion by A. H. Horton and H. J. Jackson of the flood of February and March, 1913, including a comparison with some earlier floods, constitutes Water-Supply Paper 334 of the U.S. Geological Survey. The direct cause of the great floods of March and April, 1913, as well as of those of the same months in 1907 and of February, 1884, was heavy rainfall, but the flood of last year stands out from its predecessors especially because of the exceptional magnitude and intensity of the storms, and because the greatest damage was done along tributaries of the Ohio which had not previously been responsible for much inundation. The rain that caused the recent flood was exceptionally heavy throughout the northern part of the basin, amounting to 10 or more inches on the divide in Northern Ohio. The winter had been mild and wet, and when the rains which were the immediate cause of the flood commenced, the ground was already saturated and the river channels fairly well filled. In 1907 the conditions were similar, but melting snow was responsible for much of the mischief, in addition to heavy rain. In 1884 the conditions were somewhat different from those prior to either of the other two floods. The month of January was very cold, with a heavy snowfall throughout the basin, and at the beginning of the rains there were large quantities of snow on a hard-frozen ground so that little water could be absorbed, this condition being as favourable to rapid run-off as that afforded by a saturated soil. The 1913 flood originated primarily in the comparatively small area in the northern part of the basin at the headwaters of Muskingum, Scioto Miami, and Wabash rivers. Although the southern tributaries contributed a fair amount of water to the main stream, the four tributaries just mentioned are responsible for the

great damage and loss of life and for the high stages reached on the Ohio at and below Marietta. The 1907 flood originated principally in the area above Pittsburgh and in the northern tributaries. In 1884 the flood was general throughout the basin. No flood that has ever occurred in the Ohio valley has been productive of so much damage as that of 1913. The authors conclude with a few remarks upon methods of flood-control and prevention of damage. The paper is copiously illustrated by maps, curves, and photographs.

The "Mud-lumps" of the Mississippi Delta.—Although sometimes treated in text-books as a typical example of a river-delta on the large scale (possibly because data as to its rate of growth are more easily obtainable than in the case of other great deltas), the Mississippi delta presents features which have not been observed elsewhere, and which therefore deserve special attention. The "bird's foot" form assumed by the main outlets, which have pushed themselves far beyond the general outline of the coast, is by no means typical of deltas in general, but a possibly more remarkable feature is the constant formation of islands of mud, generally just outside the mouths of the main outlets, to which the name "mud-lumps" has been locally applied. Much discussion has been devoted to their mode of origin, without the discovery of any generally accepted explanation; although, in view of the hindrance to navigation which may be caused by the formation of these mud islands, the subject is of much practical importance. Among the most competent students of the question has been Prof. E. W. Hilgard, whose rediscussion of the question some two years ago was referred to in the *Journal* at the time (vol. 29, p. 614). Since then a systematic study of the mud-lumps has been undertaken as part of the Coastal Plain investigations of the U.S. Geological Survey, and it is hoped that the desired solution of the question may in time be forthcoming, and that the formation of mud-lumps, where detrimental to navigation, may be preventible by suitable measures. A preliminary statement of the results so far attained has been issued as *Professional Paper* 85-B of the Survey, by Mr. E. W. Shaw, who devoted some time to a general study of the delta and the collection of samples of mud and water, in 1912 and 1913. He found the actual geography of the delta quite different from that indicated in the latest charts, no less than 100 square miles of land being there represented as water, and many square miles of water represented as land. By use of a sampling rod, pushed down in places to depths of some 50 feet, light was gained as to the composition and structure of the deposits, at least of their upper portion, which consists in general of thin layers of dark blue clay and fine sand and many beds of intermediate character. It was found that the sandy strata were much more resistant than the clay or clayey silt, the most rigid materia being apparently a mixture of clay and sand in certain definite proportions. The character of the deposit varies according to season (being coarser at the period of high water), so that a structure results comparable to the annual rings of trees, by which at least the principal floods and times of drought are probably recorded. As regards conditions of growth, Mr. Shaw believes that a hitherto unsuspected process is in operation, viz. a bodily flowage of certain layers towards the sea. Prof. Hilgard, it will be remembered, thought that the formation of the mud-lumps was due to the upward discharge, under pressure, of a deep-seated stratum of fluid mud. Mr. Shaw's suggestion is that, equally as a result of increased load, the intercalated soft layers of clay are forced laterally to spots where the pressure is less, coming here to the surface as mud-lumps, which are far the thickest layers of clay found in the delta. That they occur just at the mouths of the passes may be due to the greater resistance of the "foreset" deposits which form the seaward slope of the delta. Many facts tell against the gaseous origin which has been ascribed to the mud-lumps, while the borings have so far lent no support to the idea of a deep-seated fluid layer.

Petroleum in the Argentine.—A good deal of attention has lately been aroused by discoveries of petroleum in the Argentine, and sanguine expectations have been formed of the possibilities of its profitable exploitation, although not always based on technical knowledge of the conditions. But that a successful development of the petroleum industry in certain areas may be anticipated seems indicated by the results of investigations carried out in the sub-Andine region of Salta, in the north-west of the Republic, by Señor Guido Bonarelli, a geological expert who has devoted many years to the examination of petroleum deposits in various parts of the world. This gentleman gave an account of his studies and their results before the Argentine Scientific Society in April of last year, and his paper is published in the *Anales* of that body, Vol. 76, 1913. The districts visited lie in the Department of Oran, adjoining the Bolivian frontier, on both sides of the Rio Bermejo, and form part of the sub-Andine zone, conciding with the "petroliferous" formation of Brackebusch, one of the few geologists who have devoted serious study to this region. Señor Bonarelli gives a clear sketch of its orography and structural features, which show an intimate relation to each other. On the west the outer ranges of the Andes run from north to south and fall to a parallel line of depression, which is again bounded to the east by a series of ridges, likewise running north and south, which the writer gives the name Sub-Andine Sierras. The rivers flow either in longitudinal valleys, like the Rio Seco and the Rio San Francisco (a southern tributary of the Bermejo), or break through the Sub-Andine Sierras by transverse valleys. By combining his own observations with those of previous investigators (principally Brackebusch and Steinmann) Señor Bonarelli arrives at the following conclusions as to the geological history of the region. The "petroliferous formation" is of marine origin, having been deposited off the eastern flank of a land which occupied the site of the Andes. From the Permo-Carboniferous age to the middle Tertiary the region was subject to but unimportant tectonic movements, though affected by the so-called Cenomanian transgression, by which part of the old land was covered by the sea. During the Tertiary movements which gave rise to the Andes, the zone in question was subjected to a process of wrinkling, the results of which are to be seen in the present parallel ridges, which correspond to a series of anticlines. It is with these anticlines that (as in other parts of the world) the most promising indications of petroleum are indicated; and as they are both numerous and good in quality, the writer concludes that a development of the industry may be looked forward to with some confidence.

The Ice-fields of the Patagonian Cordillera.—In the *Zeitschrift für Gletscherkunde* for April of this year, Dr. Hans Steffen supplies a useful summary of our knowledge of the ice-fields of the Cordillera of Southern Patagonia, and points out the important field for further research which they offer. The part of the range dealt with lies between 45° 51′ and about 51° 30′ S. lat., being divided in two by the transverse furrow of Baker channel and its branches. The explorations of various travellers (among which Dr. Steffen's own have played no mean part) have merely touched the outer fringe of this section of the Cordillera, bringing to light the lower portions of many great glaciers, while the inner zone remains to the present a virtual *terra incognita*. The northern ice-fields reach their greatest development in 46° 40′, around the imposing landmark of Monte San Valentin, where their breadth covers a whole degree of longitude (73°–74° W.), or about 76½ kilometres (47½ miles). The first report of extensive snow and ice-fields in this region was due to the Spanish naval officer Antonio de Vea (1675), but it was the Chilian officer Enrique Simpson who first mooted the idea of a continuous covering of ice over the interior parts of the range. Dr. Steffen himself, in his various journeys, brought to light various glaciers descending from the central

zone, and was tempted to believe that a great ice-filled depression might intervene between the outer coast ridges and a lofty range lying further east, and might feed the glaciers of which the lower parts had been discovered. The southern ice-fields cover a greater extent in latitude, and in their northern portion reach a breadth of 70 kilometres (43½ miles). In 49° 30′ S. the ice-fields closely approach the inner line of fiords navigated by steamships, and the course followed by these leads through water strewn with icebergs. It is worthy of note that a description of the ice by which the heads of some of the fiords are blocked dates from so far back as 1558, being found in the Journal of Francisco Cortés Ojea, the second in command in Ladrillero's expedition. In recent times our knowledge has been increased by the work of Moreno, Hauthal, and others, but Dr. Steffen points out that nothing is really known of the character of the interior ice-masses. While some have spoken of them as constituting an ice-sheet ("Inlandeis"), no facts yet brought to light point to the existence of an ice-sheet like those of Greenland or Alaska: at any rate, there is no question of a coalescence of the ice into a continuous sheet as it debouches on the lowlands. It is possible that continuous névé-fields may occupy elevated plateaux or hollows in the centre of the range, and feed a number of separate glaciers, as in the case of the Jostedalsbrae; but Dr. Steffen inclines to the opinion that true Alpine forms of glaciation may occur in many places, and that the Cordillera may in reality be broken up into a number of separate massifs by transverse depressions. The supposed volcanic nature of parts of the range also requires elucidation. Some light on the problems awaiting solution may perhaps be gained through the expedition lately undertaken by Dr. F. Reichert* and Prof. Hicken.

GENERAL.

Memorial to Lieut. Bowers.—We understand that the brother officers of the late Lieut. Bowers are erecting a memorial tablet in the Cathedral at Bombay, and a similar one in the Church at Rothesay. The inscription is to run—

To
the Glory of God
and sacred to the Memory of
HENRY ROBERTSON BOWERS,
A lieutenant of the Royal Indian Marine,
who lost his life in the Scott Antarctic
Expedition on the return journey from
the Pole, on or about the 27th March, 1912.
Aged 28 years.

"As the troubles have thickened about us his dauntless spirit ever shone brighter, and he has remained cheerful, hopeful, and indomitable to the end" (R. F. Scott).

This tablet was erected by his brother officers on the active and retired list as a mark of their admiration of his zeal and integrity at all times.

Admiralty Surveys in 1913.—The annual report of the Hydrographer contains an account of the work done during the year around the British coasts and abroad. The *Endeavour* (Captain E. C. Hardy), in company with her tenders

* Dr. Reichert's former journeys were referred to in the *Journal*, vol. **36**, p. 496; **38**, p. 77.

H.M. Surveying Ships *Daisy* and *Esther*, left Chatham in June, and began an examination of the shoals in the southern approach to the Would between Winterton ness and Haisborough gat. This survey revealed considerable changes in the banks since their last survey in 1885. A set of experiments was made during the survey to ascertain at what distance and under what circumstances the submarine bell of the recently established Swarte bank light-vessel could be heard. The result of these experiments was that under the most favourable circumstances with the ship under way, the submarine bell was heard up to a distance of 10 miles, and with the engines stopped and the ship placed at right angles to the direction of the light vessel, the bell was heard up to a distance of 21 miles. In July the *Research* (Captain H. B. T. Somerville) picked up *S.S. Vivid* of Oronsay in a sinking condition, due to striking on a rock. Though a search was made for the reported danger, no rock was discovered not previously marked on the chart. In the estuary of the Thames, the *Triton* (Lieut. and Commander L. D. Penfold, was employed in June in obtaining soundings in the vicinity of the *Girdler* light-vessel, and in ascertaining the direction and strength of the surface and under-currents in the river Medway. In September the *Triton* sailed for Dover, and re-surveyed the Admiralty and Commercial harbours on a scale of 15 inches to the sea mile. Portsmouth and Plymouth harbours and the south coast of England were surveyed by Lieut. F. May and assistants of the *Sir James*. In September, Albert reef, on the south-west side of Adelie island, and the Mackay group, off the north-west coast of Australia were both successfully connected to the outer soundings of Kovlan island by means of a floating triangulation. In June the triangulation of Malaita, Guadalcanal, and Florida islands was begun by H.M. *Sealark*. The triangulation covered an area of about 4000 square miles, and was much interrupted by the almost daily rain experienced in the Solomon islands. In the beginning of the year H.M. *Mutine* (Lieut. and Commander J. A. Edgell) was surveying on the Liberian coast. During the progress of the survey a meridian distance was run between Cape Palmas and Gubbubo point. At the beginning of the year, the Royal Indian Marine vessel *Investigator* was employed surveying the Mergui archipelago.

Proposed National Oceanographical Institute in Scotland. — An important scheme for the foundation of a Scottish Oceanographical Institute as a memorial to the late Sir John Murray, was inaugurated at a meeting held on May 25 last, in the rooms of the Royal Society of Edinburgh, in which Prof. James Geikie, F.R.S., Lord Strathclyde, and other influential citizens took part. In moving a resolution in support of the proposed scheme, Prof. Geikie referred to the two oceanographical laboratories already existing in Edinburgh, which had been established respectively by Sir John Murray and Dr. W. S. Bruce, and which had done excellent work in the past. The two were more or less complementary to each other, and much advantage might be expected from their amalgamation into a single institute, which would be a most suitable memorial to the late Sir John Murray. Apart from the mere housing of collections, such an institution might do a great deal as a central body to which funds could be allocated by the Government, or by private persons for useful purposes. It would also form the centre of oceanographical science within the city of Edinburgh. It is well known that it was Sir John Murray's intention to take steps in the direction of making some permanent establishment, so that the proposed memorial is specially appropriate.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are as a rule written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Gen. = Genootschap.
Ges. = Gesellschaft.
I. = Institute, Institution.
Int. = International.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
Jber. = Jahresbericht.
k.(k.) = kaiserlich (und königlich).
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is $10 \times 6\frac{1}{2}$.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE

Alps—Dolomites—Nomenclature. *Archivio Alto Adige* **8** (1913): 211–222. **Marini.**
Il Gruppo di Sella nella toponomastica. By Dante Marini. *Map and Illustrations.*

Andorra—Anthropogeography. *B.S. Languedoc. G.* **36** (1913): 261–289. **Sorre.**
La vie pastorale en Andorre. Par Max Sorre. *Sketch-maps and Illustrations.*

Austria—Climatology. **Jelinek.**
Jb. k.k. Zentral-Anst. Met. Wien **47** (1910): *Anhang*, pp. 49.
Hundertjährige wahre Tagesmittel der Temperatur in Wien von 1775 bis 1874. Von Karl Jelinek.

Balkan Peninsula. *B.S. Serbe G.* (1913): 234–265. **Cvijić.**
La répartition des nationalités balkaniques. Par J. Cvijić. *Map* [In Servian.]

Baltic—Currents. **Jacobsen.**
Meddelelser Komm. Havunder-søgelser: Hydrografi **2** (1913): No. 3, pp. 44.
Strommessungen in der Tiefe in Dänischen Gewässern in den Jahren 1909, 1910 und 1911. Von J. P. Jacobsen. *Sketch-map and Diagrams.*

Denmark—Hydrology. **La Cour.**
Publikat'oner fra det Danske Meteorologiske Institut. Meddelelser, Nr. 1. Quasinivellement; nogle orienterende Undersøgelser vedrørende de Danske Vandstandsmaalinger. Af D. la Cour. Copenhagen, 1913. Size 10 × 7, pp. 83. *Diagrams.*

France—Brittany. *C.R.A. Sc. Paris* **157** (1913): 1057–1059. **La Porte.**
Modifications de la côte sud de Bretagne, entre Penmarc'h et la Loire. Par F. La Porte.

France—Rhône. *La G., B.S.G. Paris* **29** (1914): 153–162. **Martel.**
La "perte" et le cañon du Rhône. (Avec une bibliographie.) Par E.-A. Martel. *Illustrations*
See note in the Monthly Record, July, p. 95.

Germany—Black Forest—Historical. **Mehlis.**
Petermanns M. 60 (1914): I. 13–17, 74–77.
Die klassischen Namen des Schwarzwaldes. Von Prof. Dr. Christian Mehlis. *Illustrations.*

Germany—Leipzig. *J.G.* 12 (1914): 170–174. **Cleef.**
Leipzig. The sum of parallel forces. By Eugene Van Cleef. *Sketch-maps.*

Germany—Mecklenburg—Coast. **Geinitz.**
Die Sturmflut von 30. Dez. 1913 in ihrer Einwirkung auf die mecklenburg-Küste. Von E. Geinitz. (Mitt. Grossherz. Meckl. Geol. Landesanstalt, xxvii.) Rostock, 1914. Size 11½ × 9, pp. 11. *Sections and Illustrations.*

Germany—Mecklenburg—Geomorphology. **Gross**
Die Entstehung des Warnowtals von Eickhof bis Rostock. Von R. Gross. (Mitt. Grossherz. Meckl. Geol. Landesanstalt, xxvi.) Rostock, 1914. Size 11½ × 9, pp. 31. *Maps and Sections.*

Germany—Phytogeography. *Petermanns M.* 60 (1914): I. 72–73. **Krause.**
Pflanzengeographische Bemerkungen zur Karte des Deutschen Reichs in 1:100,000. Von Dr. Ernst H. L. Krause.

Germany—Pomerania—Moors. **Dreyer.**
Die Moore Pommerns, ihre geographische Bedingtheit und wirtschafts-geographische Bedeutung. Inaugural-Dissertation von Johann Dreyer. Greifswald, 1913. Size 9½ × 6, pp. xii. and 320. *Maps and Illustrations.*

Germany—Prussia. *G.Z.* 20 (1914): 35–46. **Braun.**
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Le delta du Rhin dans l'antiquité et au moyen-âge. Par Étienne Clouzot. *Sketch-map.*

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Origines et physionomie actuelle de la Roumanie. Par Dr. R. Millant.

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Sur l'évolution de la plaine roumaine entre les rivières Olt et Arges. Par G. Vâlsan.

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See note on this expedition in vol. **39**, p. 69.

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Der Stand der grossen russischen Kanalpläne. Von Dr. Richard Hennig.

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The Chiltern Wind-gaps. By Dr. J. W. Gregory.

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On the correlation of weather and crops in the East of Scotland. By Andrew Watt. *Diagrams.*

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China—Prefectures. **Moidrey.**

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Die Japanische Auswanderung. Von Dr. Ernst Grünfeld.

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Die Landwirtschaft, Tierzucht, und Kolonisation Hokkaidos, deren Stand und Zukunft. Von Dr. Max Müller.

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Topography of Teshio and Kitami Provinces in Hokkaido. By Y. Okamura. *Sketch-map and Illustrations.*

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Der verheerende Ausbruch des Vulkans Sakurajima im Süden der japanischen Insel Kiuschiu. Von Dr. K. Nishio und Immanuel Friedlaender. *Maps and Illustrations.*

Malay Archipelago—Alor and Pantar. ———

Ts. k. Ned. Aardr. Genoots. **31** (1914): 70–102.

Die eilanden Alor en Pantar, residentie Timor en onderhoorigheden. *Map.*

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A contribution to the flora and plant formations of Mount Kinabalu and the highlands of British North Borneo. By Lilian S. Gibbs. *Sketch-map and Illustrations.*

The systematic account of the flora is prefaced by notes on the general character of the country, and its climate, and by an outline of the author's journeys, with general description of the vegetation.

Malay Archipelago—Celebes. **Goedhart.**

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Nota van toelichting betreffende het zelfbesturend landschap Barroe. Door Om. Goedhart.

Malay Archipelago—Celebes. *Petermanns M.* **60** (1914): 8–81, 133–136. **Wanner.**

Eine Reise durch Ostcelebes. Von Prof. Dr. Johannes Wanner. *Map.*

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Geologische Beobachtungen in Ost-Celebes. Von H. Hirschi. *Sketch-maps and Illustrations.*

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Een verkenningstocht over het eiland Soemba. Door H. Witkamp. *Sketch-maps and Illustrations.*

Malay Archipelago—Timor—Geology. **Molengraaff.**

P. Sec. Sc. K.A.W. Amsterdam **15** (1912–13): 224–235.

On recent crustal movements in the island of Timor and their bearing on the geological history of the East Indian archipelago. By G. A. F. Molengraaff. *Section and Sketch-map.*

Mongolia. *J. Central Asian S.* (1914): 3-13. **Gull.**

A visit to Mongolia. By E. Manico Gull.

Russia—Siberia—Coasts. **Vilkitzky.**

Arctic Ocean Routes. By A. Vilkitzky. (Supplement to 'Memoirs on Hydrography,' vol. 35.) St. Petersburg, 1912. Size 9 × 6, pp. 40. *Sketch-map and Illustrations.* [In Russian.]

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Zur Frage von den äusseren Verbindungen Sibiriens mit Europa. Von A. Sibiriacoff. Zürich, 1910. Size 9 × 6, pp. 76.

Russia—Siberia—Yamal. *Zap. Imp. Russ. G.S., Gen. Geog.* **49** (1913): 1-348. **Zhitkof.**

The Yamal peninsula. By B. M. Zhitkof. *Maps and Illustrations.* [In Russian.]

Some account of Mr. Zhitkof's (Shitkof's) important exploration of this peninsula was given in vol. **39**, p. 73.

Turkey—Kurdistan. *Petermanns M.* **60** (1914): I. 21–25. **Bachmann.**

Bericht zur Routenkarte von Mossul nach Wan. Von Dr. Wilhelm Bachmann. *Maps and Illustrations.*

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Some aspects of Abyssinia, with special reference to the western frontier. By Captain H. H. Kelly. *Sketch-map.*

Africa—Ethnology. *J.R. Anthrop. I.* **43** (1913): 375–421. **Johnston.**

A survey of the ethnography of Africa: and the former racial and tribal migrations in that Continent. By Sir H. H. Johnston.

Canaries—Teneriffe. *Z. Vulkanologie* **1** (1914): 20–31. **Perret.**

The volcanic eruption at Teneriffe in the autumn of 1909. By Frank A. Perret. *Sketch-map and Illustrations.*

Canaries and Madeira. *Geol. Charakterbilder* (*Stille*) (1914): Heft 20, 8 Plates. **Gagel.**

Vulkanische Erscheinungen des nordwestafrikanischen Inseln. Phénomènes volcaniques des Canaries et de Madère. Von C. Gagel. *Illustrations.*

Cape Colony—Stellenbosch—Geology. **Shand.**

T. Geol. S. South Africa **16** (1913): 147–161.

The terraces of Eerste river at Stellenbosch. By Dr. S. J. Shand. *Sketch-map and Illustrations.*

Egypt—Nile—Delta. *Cairo Sc. J.* **8** (1914): 1–3. **Keeling.**

The fertility map of the Delta. By B. F. E. Keeling.

See note in the July number, p. 97.

French Equatorial Africa. *La G., B.S.G. Paris* **28** (1913): 345–371. **Terrier.**

Mission astronomique à la côte du Gabon et dans le bassin du bas Ogooué. Par Le Terrier. *Sketch-map and Diagrams.*

See note in vol. **43**, p. 443.

German East Africa—Nyasa. **Frey.**

M. deuts. Schutzgebieten, Ergänzungsheft No. 10 (1914): pp. 64.

Der Njassasee und das deutsche Njassaland. Versuch einer Landeskunde. Von Gisela Frey. *Maps and Diagrams.*

Kamerun—Borderlands. ———

M. deuts. Schutzgebieten, Ergänzungsheft No. 9A (1914): pp. 132.

Die Grenzgebiete Kameruns im Süden und Osten. Hauptsächlich auf Grund der Ergebnisse der Grenzexpeditionen. Landeskundlicher Teil. *Maps and Illustrations.*

Morocco. *B.R.S.G. Madrid* **55** (1913): 292–390. **Blázquez y Delgado-Aguilera.**

Estudios geográfico-históricos de Marruecos. Por Antonio Blázquez y Dalgado-Aguilera.

Morocco—Spanish Sphere. *B.R.S.G. Madrid* **55** (1913): 265–291. **Iñiguez.**

Los terrenos de nuestra zona de influencia en marruecos. Por Fernando Iñiguez.

Sahara—Jarabub. **Rémond.**

Quatre mois chez le Grand Senoussi. Notes et photographies rapportées par le docteur Abdul Gani Bey de son voyage et de son séjour à Djaraboub. Par Georges Rémond. (From *l'Illustration*, 7 Février, 1914.) Paris, 1914. Size 16 × 12, pp. 63–103. *Sketch-map and Illustrations.*

See abstract in vol. **43**, p. 338.

South Central Africa—Geology. *T. Geol. S. South Africa* **16** (1913): 44–106. **Studt.**

The geology of Katanga and Northern Rhodesia; An outline of the geology of South Central Africa. By F. E. Studt. *Maps, Illustrations, and Sections.*

Tanganyika. *Ann. Hydrographie* **41** (1914): 27–34. **Jacobs.**
Erkundungsfahrten auf dem Tanganika-See in der Zeit vom 2. Juni bis 19. Juli 1913. Von Kapt. Jacobs. *Map.*

Some results of Captain Jacobs' soundings were mentioned in vol. **42**, p. 572. Samples of the bottom were also taken.

Transvaal—Rand—Geology. *T. Geol. S. South Africa* **16** (1913): 1–32. **Mellor.**
Structural features in the Western Witwatersrand. By Dr. E. T. Mellor. *Map and Sections.*

Tripoli. *Riv. Coloniale*, Ann. IX. **1** (1914): 205–216. **Roselli.**
Colla colonna Miani: La regione e le vie fra Murzuk e Ghat. By Mario Roselli. *Illustrations.*

Tripoli—Ghadames—Archæology. *Rev. Col.* **2** (1913): 309–318. **Pavoni.**
Notizie archeologiche sui monumenti antichi di Ghadames. Per A. Pavoni. *Illustrations.*

Uganda—Languages. *J. African S.* **13** (1914): 152–166. **Crabtree.**
The languages of the Uganda Protectorate. By W. A. Crabtree.

Wadai—Geology. *C.R.A. Sc. Paris* **158** (1914): 437–439. **Azéma and Jamot.**
Sur l'Ouadai. Par MM. Azéma et Jamot.

West Africa—Boundary. ——
Treaty Series, 1913. No. 19. Agreement between the United Kingdom and France respecting the boundary between Sierra Leone and French Guinea. London, September 4, 1913. London: Wyman & Sons, 1913. Size 9½ × 6, pp. 6. *Map. Price* 6½*d.*

See note in the February number, p. 203.

NORTH AMERICA.

Canada—Forestry. **Leavitt.**
Commission of Conservation, Canada. Committee on Forests. Forest protection in Canada, 1912. By Clyde Leavitt. Toronto, 1913. Size 10½ × 7, pp. x. and 174. *Sketch-map and Illustrations.*

Canada—Geological Guides. **Geological Survey.**
Canada, Geological Survey. Guide Book No. 1. Excursion in Eastern Quebec and the Maritime provinces. Two parts (pp. 408). No. 2. Excursions in the Eastern Townships of Quebec and the Eastern part of Ontario (pp. 142). No. 3. Excursions in the neighbourhood of Montreal and Ottawa (pp. 162). No. 4. Excursions in South-western Ontario (pp. 142). No. 5. Excursions in the Western Peninsula of Ontario and Manitoulin Island (pp. 108). No. 8. Transcontinental excursion C. 1. Toronto to Victoria and return viâ Canadian-Pacific and Canadian Northern Railways. Three parts (pp. 386). No. 9. Transcontinental excursion C. 2. Toronto to Victoria and return viâ Canadian-Pacific, Grand Trunk Pacific and National Transcontinental Railways (pp. 164). No. 10. Excursions in Northern British Columbia and Yukon territory and along the North Pacific coast (pp. 180). Ottawa, 1913. Size 8 × 5½. *Maps and Illustrations.*

Guides issued in connection with the Twelfth International Geological Congress in 1913. Nos. 6 and 7 of the series were issued by the Ontario Bureau of Mines (see below.

Canada—Geological Guides. **Ontario Bureau of Mines.**
Guide Book No. 6. Excursions in vicinity of Toronto and to Muskoka and Madoc (pp. 68). No. 7. Excursions to Sudbury, Cobalt, and Porcupine (pp. 150). Issued by the Ontario Bureau of Mines, Toronto, 1913. Size 8 × 5½. *Maps and Illustrations.*

Canada—Gulf of St. Lawrence. **Department of Naval Service.**
The currents in the Gulf of St. Lawrence. From investigations of the Tidal and Current Survey in the seasons of 1894 to 1896, 1906, 1908, 1911 and 1912. Published by the Department of the Naval Service. Ottawa, 1913. Size 10 × 6½, pp. 46. *Map.*

See note in the August number.

Canada—Water-power. **White.**
Commission of Conservation, Canada. Committee on waters and water-powers. Long Sault Rapids, St. Lawrence river. An enquiry into the constitutional and

other aspects of the project to develop power therefrom. By Arthur V. White. Ottawa, 1913. Size 10 × 7, pp. 384. *Maps and Illustrations.*

Newfoundland. *Scottish G. Mag.* **30** (1914): 113–128. **White.**

Newfoundland: a study in regional geography. By Arthur Silva White. *Sketch-map.*

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Department of Commerce. U.S. Coast and Geodetic Survey. Geodesy. Special publication No. 16. Triangulation along the west coast of Florida. By Clarence H. Swick. Washington, 1913. Size 11 × 9, pp. 148. *Maps.*

United States—Geomorphology. **Henning.**

G.Z. **19** (1913): 513–525, 566–577, 625–639, 673–688.

Neuere Forschungen zur Tektonik und Geomorphologie der Vereinigten Staaten von Nordamerika. Von Karl L. Henning. *Sketch-maps.*

United States—Historical. *B.R.S.G. Madrid* **55** (1913): 504–523. **Conrotte.**

Una cuestion de limites entre España y los Estados Unidos en el siglo XVIII. Por Manuel Conrotte.

United States—Illinois—Geology. *J. Geology* **21** (1913): 731–742. **Trowbridge.**

Some partly dissected plains in Jo Daviess county, Illinois. By Arthur C. Trowbridge. *Section.*

United States—Meteorology. **Manley-Bendall.**

Société d'Océanographie du Golfe de Gascogne. Le Service Météorologique des États-Unis. (The United States Weather Bureau.) Rapport par M. Manley-Bendall. Bordeaux, 1913. Size 10 × 6½, pp. 54. *Sketch-maps and Illustrations.*

United States—Meteorology. **Pearson.**

Monthly Weather Rev. **41**, 1913 (1914): 1615–1629.

A meteorological study of parks and timbered areas in the western yellow-pine forests of Arizona and New Mexico. By G. A. Pearson. *Illustrations and Diagrams.*

United States—Mississippi. *U.S. Geol. Surv., Prof. Paper* **85** B (1913): pp. 28. **Shaw.**

The mud lumps at the mouths of the Mississippi. By Eugene Westley Shaw. *Sketch-maps, Sections, and Illustrations.*

See note in the Monthly Record.

United States—New England. *B.G.S. Philadelphia* **12** (1914): 27–30. **Hubbard.**

New England; her forests and her people. By Dr. George D. Hubbard. *Illustrations.*

United States—New York. *B. American G.S.* **46** (1914): 25–35. **Brigham.**

Early interpretations of the Physiography of New York. By Albert Perry Brigham.

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Wood-using industries of New York. By John T. Harris. (From 'The New York State College of Forestry, at Syracuse University,' Ser. xiv., No. 2, 1913.) Albany, 1913. Size 9 × 6, pp. 214. *Illustrations.*

United States—New York—Historical. **Borchgrave.**

B.S. Belge d'Études Col. **20** (1913): 877–922.

La part des Belges dans la fondation de l'Etat de New-York. Par Baron de Borchgrave. *Illustration.*

United States—Oceanography. **Bigelow.**

Explorations in the Gulf of Maine, July and August, 1912, by the U.S. Fisheries Schooner *Grampus*. Oceanography and notes on the plankton. By Henry B. Bigelow. (From *Bull. Mus. Compar. Zool.*, Harvard College, vol. **58**, No. 2, 1914.) Cambridge, Mass., 1914. Size 10 × 6½, pp. 31–147. *Maps and Diagrams.*

United States—Ohio—Flood. **Horton and Jackson.**

U.S. Geol. Surv., Water-supply paper 334 (1913): pp. 96.

The Ohio Valley flood of March–April, 1913. (Including comparisons with some earlier floods.) By A. H. Horton and H. J. Jackson. *Sketch-map, Illustrations, and Diagrams.*

United States—Survey. **U.S. Geological Survey.**

United States Geological Survey. Thirty-fourth Annual Report of the Director of the United States Geological Survey to the Secretary of the Interior, for the

fiscal year ended June 30, 1913. Washington, 1913. Size 9 × 6, pp. 184. *Sketch-maps.*

United States—Texas—Survey. **Mourhess.**

Department of Commerce. U.S. Coast and Geodetic Survey. Geodesy. Special Publication No. 17. Triangulation on the Coast of Texas, from Sabine Pass to Corpus Christi Bay. By Charles A. Mourhess. Washington, 1913. Size 11½ × 9, pp. 90. *Maps.*

CENTRAL AND SOUTH AMERICA.

Argentine—Phytogeography. **Hauman-Merck.**

Ann. Museo Nacional, Buenos Aires **24** (1913): 289–442.

Étude phytogéographique de la région du Rio Negro inférieur (République Argentine). Par Lucien Hauman-Merck. *Illustrations.*

Includes a study of the geographical conditions.

Argentine—Surveys. **Instituto Geografico Militar.**

República Argentina: Estado Mayor del Ejército. Anuario del Instituto Geografico Militar. 2do Volumen, correspondiente al año 1913. Buenos Aires, 1913. Size 11½ × 9, pp. vi., 139, and 116. *Maps and Illustrations.*

Bolivia—Language. **Créqui-Montfort and Rivet.**

Linguistique Bolivienne. La langue Lapaču ou Apolista. Par G. de Crequi-Montfort and M. Rivet. (From *Zeitschrift für Ethnologie*, Heft 3, 1913.) [Berlin, 1913.] Size 10 × 6½, pp. 512–532. *Sketch-map and Illustrations.*

Bolivia—Potosi. *B.S.G. Potosí* **1** (1913): 30–51. **Benino.**

Relacion muy particular del cerro y minas de Potosi y de su calidad y labores. Por Nicolás del Benino.

Reprint of a report written in 1573.

Brazil—Ethnology. **Knoche.**

Algunas indicaciones sobre los Uti-krag del Rio Doce (Espíritu Santo). Por Walter Knoche. (From *Rev. de Hist. y Geogr.*, Ano III. Tomo V., 1913.) Santiago, 1913. Size 9½ × 6½, pp. 14. *Illustrations.*

Brazil—Ethnology. **Schuller.**

Zur affinität der Tapúya-Indianer des Theatrum rerum naturalium Brasiliæ. Von Rudolf R. Schuller. (From *Internationales Archiv für Ethnographie*, Bd. xxi., 1912.) Leyden, [1912]. Size 13 × 9½, pp. 22.

Falklands—Phytogeography. **Skottsberg.**

K. Svenska Vet.-A. Handlingar **50** (1913): No. 3, pp. 128.

Botanische Ergebnisse der Schwedischen Expedition nach Patagonien und den Feuerlande 1907–1909. III. A botanical survey of the Falkland islands. By Carl Skottsberg. *Map and Illustrations.*

Nicaragua. **Vose**

Commercial Monographs. By Edward Neville Vose. No. 5. Nicaragua. New York, 1914. Size 9 × 5, pp. 48. *Sketch-map and Illustrations.*

Panama. **Vose.**

Commercial Monographs. By Edward Neville Vose. No. 4. Panama. New York, 1914. Size 9 × 5, pp. 48. *Sketch-map, Plan, and Illustrations.*

Peru—Archæology. **Uhle.**

Die Ruinen von Moche. Von Max Uhle. (From *Journ. Soc. Américanistes Paris*, N.S., Tome X., 1913.) Paris, 1913. Size 11 × 7, pp. 95–117. *Plans and Illustrations.*

South America—Commercial. *B. American G.S.* **45** (1913): 881–901. **Tower.**

Notes on the commercial geography of South America. By Walter S. Tower. *Sketch-maps and Diagram.*

South America—Historical. **Quevedo.**

Internat. Congress Americanists, P. XVIII. Session, 1912 (1913): 115–125.

The great "Chanca" confederacy: an attempt to identify some of the Indian nations that formed it. By [S. A.] Lafone Quevedo. *Map.*

South America—Water-power. *B. Pan-American Union* **37** (1913): 633–656. **Freeman.**

Hydro-electric operations in South America. By Lewis R. Freeman. *Illustrations.*

The illustrations represent some of the finest South American waterfalls, some of them by no means well known.

Venezuela—Orinoco. **Messerly.**
Le Globe, S.G. Genève, **52** (1913) : No. Spécial, pp. 71–77.
Le Delta de l'Orénoque. Par Oscar Messerly.

West Indies—Grand Cayman. *Kew B.* (1913): 367–372. **English.**
Some notes from a West Indian coral island. By T. M. Savage English.

West Indies—Historical. *Rev. l'Hist. Colonies Françaises* **1** (1913): 385–482. **Servant.**
Les compagnies de Saint-Christophe et des îles de l'Amérique. (1626–1653.) Par Georges Servant.

AUSTRALASIA AND PACIFIC ISLANDS.

Easter Island—Meteorology. **Montessus de Ballore and others.**
Instituto Central Meteorologico y Geofisico de Chile. No. 4. Observaciones Meteorologicas en la Isla de Pascua, Mayo 1911—Abril 1912. Con estudios de F. de Montessus de Ballore, F. Fuentes, J. Felsch, W. Knoche. Santiago, 1913. Size 15 × 10½, pp. viii. and 180. *Sketch-maps, Diagrams, and Illustrations.* [In German and Spanish.]

New Guinea—Exploration. *Ts. k. Nederl. Aardr. Genoots.* **31** (1914): 103–111. **(Staal.)**
De exploratie van Nieuw-Guinea. Door J. J. S. *Sketch-map.*
The most important item (to which the map refers) is an account of exploration in the coast stretch between the Island river and Cook's bay.

Tasmania—Ben Lomond. **Giblin and others.**
Papers and P.R.S. Tasmania, 1913 (1914): 5–14.
The height of Ben Lomond. By L. F. Giblin, E. L. Piesse and H. R. Hutchison. *Map.*
Legge peak, at the north end of the range, has been found by triangulation to be 5160 feet above sea-level (cf. *Journal*, vol. **31**, p. 109), or the highest known summit of Tasmania.

Tasmania—Cartography. *Papers and P.R.S. Tasmania*, 1913 (1914): 76–78. **Legge.**
A rectification in the cartography of North-East Tasmania. By Colonel W. V. Legge. *Illustrations.*

POLAR REGIONS.

Antarctic—Meteorology. *G.Z.* **20** (1914): 18–34. **Meinardus.**
Aufgaben und Probleme der meteorologischen Forschung in der Antarktis. Von Wilh. Meinardus. *Sketch-maps and Section.*

Spitsbergen. *Petermanns M.* **60** (1914): I. 27–29. **Ritscher and Wichmann.**
Der Abschluss der Schröder-Stranz-Expedition. Von Kapt. A. Ritscher und H. Wichmann. *Map.*

Spitsbergen. **Staxrud and Wegener.**
Die Expeditionen zur Rettung von Schröder-Stranz und seine Begleitern. Geschildert von ihren Führern Hauptmann A. Staxrud und Dr. K. Wegener. Berlin: D. Reimer, 1914. Size 9 × 6, pp. xiv. and 101. *Map and Illustrations. Price Mk.*4.

Spitsbergen—Norwegian Expedition. *La G., B.S.G. Paris* **29** (1914): 177–182. **Hoel.**
Résultats généraux de l'expédition norvégienne au Spitsberg en 1913. Par Adolf Hoel. *Illustrations.*

MATHEMATICAL GEOGRAPHY.

Cartography—Relief-map. *La Geografia* **2** (1914): 30. **[Agostini.]**
La Carta Topografica del Canavese e dintorni. Saggio di orografia plastigrafica a colori. *Map.*

Cartography—World-maps. *Petermanns M.* **60** (1914): I. 68–69. **Peucker.**
Die drei Weltkartenprojekte. Von Dr. Karl Peucker.

Longitude determination—Paris-Uccle. **Renan.**
B. Classe Sc. A.R. Belgique (1913): 227–233.
Résultats de la discussion des observations faites par MM. Delporte, astronome adjoint à l'Observatoire d'Uccle, et Viennet, astronome adjoint à l'Observatoire de

Paris, pour déterminer par la télégraphie sans fil la différence de longitude entre l'Observatoire royal de Belgique et l'Observatoire de Paris. Par Henri Renan.

See note in vol. 42, p. 75.

Methods. *G.Z.* **20** (1914): 104–109. **Alt.**

Graphische Methoden der astronomischen Geographie. Von Eugen Alt. *Diagrams.*

Survey. *La Geografia* **2** (1914): 6–16. **De Magistris.**

Del rilevamento topografico a grande scala di piccole forme del terreno. By L. F. de Magistris. *Illustrations.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Coasts. *J. Ecology* **2** (1914): 21–38. **Hill and Hanley.**

The Structure and Water-content of Shingle Beaches. By T. G. Hill and J. A. Hanley. *Illustrations.*

Denudation. *G.Z.* **20** (1914): 5–18, 81–92. **Sapper.**

Ueber Abtragungsvorgänge in den regenfeuchten Tropen und ihre morphologischen Wirkungen. Von Karl Sapper.

Geological History. *J. Geology* **21** (1913): 517–533, 577–587, 673–682. **Chamberlin.**

Diastrophism and the formative processes. Parts I. to IV. By T. C. Chamberlin.

Geology. **Henning.**

Die Red Beds. Ein Beitrag zur Geschichte der bunten Sandsteine. Von Karl L. Henning. (From *Geologische Rundschau*, Bd. IV., Heft 4, 1913.) Leipzig, 1913. Size 9½ × 6, pp. 228–244. *Section.*

Geology—Map. *La G., B.S.G. Paris* **28** (1913): 375–389. **Margerie.**

La carte géologique du Monde. Historique, état actuel, projets d'avenir. Par Emm. de Margerie.

Geomorphology. *Michigan A. Sc. Rept.* **14** (1912): 116-141. **Baker.**

The origin of continental forms. II. (By Howard B. Baker.)

Geophysics. *P. Sec. Sc. K.A.W. Amsterdam* **15** (1912–13): 1441–1450. **Bakhuyzen.**

The periodic change in the sea level at Helder, in connection with the periodic change in the latitude. By Prof. H. G. v. d. Sande Bakhuyzen.

Glaciers. *C.R.A. Sc. Paris* **158** (1914): 742–744. **Bénévent.**

Sur les encoches du verrou glaciaire. Par E. Bénévent.

Limnology—Temperature. *Deutsche Rundschau G.* **36** (1913–14): 246–252. **Ammann.**

Ueber den Einfluss der Witterungsverhältnisse auf den jährlichen Temperaturgang eines Sees. Von Dr. Hans Ammann. *Diagram.*

Meteorology. *Met. Z.* **31** (1914): 49–62. **Maurer and Dorno.**

Ueber den Verlauf und die geographischen Verbreitung der atmospharisch-optischen Störung 1912–1913. Von J. Maurer und C. Dorno. *Diagrams.*

Meteorology—Mountain "spectres." **Richarz.**

Deutsche Rundschau G. **36** (1913–14): 183–185.

Brockengespenst, Dolomitengespenst, und Ballongespenst. Von Prof. Dr. Franz Richarz. *Illustrations.*

Meteorology—Snow. **Westman.**

Meddelanden från Hydrografiska Bryån, 5. Beobachtungen über den Wasseraustausch zwischen der Schneedecke und der Luft im Mittelschwedischen Tieflande. Von J. Westman. Stockholm, 1913. Size 12 × 9½, pp. 26. *Illustrations.*

Oceanography—Atlantic. **Pettersson and Drechsel.**

Conseil Explor. Mer; Rapports et P.-V. **16** (1913): [2nd Art.] pp. 22.

Memorandum über untersuchungen im Atlantischen Ozean und Programme hierfür. Von O. Pettersson und C. F. Drechsel. *Sketch-maps and Diagrams.*

Oceanography—North Sea. **Wendicke.**

Hydrographische und biologische Untersuchungen auf den deutschen Feuerschiffen der Nordsee 1910–11: Die hydrographischen Ergebnisse. Bearbeitet von Dr. Fritz Wendicke. (Veröffentlichungen des Instituts für Meereskunde a. d. Universität Berlin, herausgegeben von Albrecht Penck. Neue Folge, A., Heft 3.) Berlin: E. S. Mittler und S., 1913. Size 10½ × 7, pp. xv., 124, and 94. *Diagrams.*

Oceanography—Sea-water. *B.I. Océanog. Monaco*, No. 281 (1914): pp. 6. **Chelle.**
Les Bromures des Eaux marines. Par Dr. Louis Chelle.

Oceanography—Sea-water. **Marchi.**
R. Comitato Talassogr. Italiano, Mem. 6 (1912): pp. 30.
La distribuzione verticale della salsedine e della temperatura e i movimenti convettivi verticale in mare. Per il prof. Luigi de Marchi.

Oceanography—Soundings. **Marchi.**
R. Comitato Talassogr. Italiano, Mem. 31 (1913): pp. 41.
Teoria degli scandagli d'alto mare. Per il prof. Luigi de Marchi.

Phytogeography. *J. Ecology* 1 (1913): 249–272. **Oliver and Salisbury.**
Vegetation and mobile ground as illustrated by Suaeda Fruticosa on shingle. By F. W. Oliver and E. J. Salisbury. *Charts and Illustrations.*
See note in the May number.

Radiation. *P. and T.R.S. Canada* 6 1912 (1913): Sec. III. 3–9. **McLennan.**
On the relative intensities of the Earth's penetrating radiation on land and sea. By Prof. J. C. McLennan. *Diagram.*

Regional geography. *G. Teacher* 7 (1913): 158–163. **Herbertson.**
Natural regions. By (Dr.) A. J. Herbertson.

Rivers. **Ufficio Idrografico del Po.**
Ministero dei Lavori Publici: Reali Commissione per gli Studi sul Regime Idraulico del Po: Ufficio Idrografico del Po. Istruzioni per la misura della temperatura dell' acqua dei fiumi. Parma, 1913. Size 10½ × 7½, pp. 6.

Rivers. *Cairo Scientific J.* 8 (1914): 67–72. **Davson and FitzGibbon.**
The Behaviour of Rivers. Some Causes and Effects. By S. Silver Davson and Elliot FitzGibbon. *Illustrations.*

Rivers—Suspended matter. **Ufficio Idrografico del Po.**
Ministero dei Lavori Publici; Reale Commissione per gli Studi sul Regime Idraulico del Po, Ufficio Idrografico del Po. Istruzioni per la misura delle torlide nei corsi d'acqua. . . . Parma, 1913. Size 10½ × 7½, pp. 11.

Seismology. *La G., B.S.G. Paris* 19 (1914): 1–22. **Clouzot.**
Une enquête seismologique au XVIII^e^ siècle. Par Étienne Clouzot.

Seismology. *C.R.A. Sc. Paris* 158 ((1914): 440–441. **Montessus de Ballore.**
Sur la distribution mondiale de la sismicité. Par M. de Montessus de Ballore.

Speleology. **Jeannel and Racovitza.**
Biospeologica (*sic.*). XXXIII. Énumération des grottes visitées, 1911–1913. (Cinquième série.) Par R. Jeannel et E.-G. Racovitza. (From *Archives de Zoologie experimentale et générale*, Tome 53, 1914.) Size 10 × 7, pp. 325–558. *Plans and Illustrations. Presented by the Authors.*

Terrestrial Magnetism. *Terrestrial Magnetism* 18 (1913): 113–126. **Bauer.**
Magnetic results of Halley's expedition, 1698–1700. By L. A. Bauer. *Illustration. Also separate copy, presented by the Author.*

Terrestrial Magnetism. **Brückmann.**
Abh. K. Preuss. Met.I. 4 (1913): No. 9, pp. 26.
Beobachtungen in den Schweizer Hochalpen über die Änderung der erdmagnetischen Kraft mit der Höhe. Von W. Brückmann. *Map and Illustrations.*

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Die Bestimmung der elemente des Erdmagnetismus und ihrer zeitlichen Aenderungen. Von Dr. H. Fritsche. Riga, 1913. Size 10½ × 6½, pp. 96. *Sketch-maps.*

Volcanoes.
Zeitschrift für Vulkanologie. Herausgeber: Immanuel Friedlaender. Band I., Heft 1. Berlin: D. Reimer, 1914. Size 9½ × 8, pp. 1–55. *Illustrations. Price Mk.*6.
The first issue of a new periodical devoted to the study of volcanoes.

Zoogeography—Fish. **Saemundsson.**
Meddelelser Kom. Havundersøgelser, Ser. Fiskeri 4 (1913): No. 6, pp. 34.
Continued marking experiments on plaice and cod in Icelandic waters. By Byarni Saemundsson. *Charts.*

Zoogeography—Wild sheep *Petermanns M.* **60** (1914): I. 70-72. **Kowarzik.**
Die Verbreitung der Wildschafe. Von Dr. Rud. Kowarzik. *Map.*
See note in the Monthly Record, June, 1914, p. 699.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. **Halbfass.**
Das Wasser im Wirtschaftsleben des Menschen. Von Prof. Dr. W. Halbfass. (Angewandte Geographie, hrsg. von Dr. H. Grothe, IV. Ser., 3. Heft.) Frankfurt: H. Keller, 1911. Size 9 × 6, pp. 133.

Anthropogeography—Dwellings. *Le Globe, S.G. Genève* **53** (1914): 16-24. **Montandon.**
L'Habitation Indigène et Paysanne dans ses Rapports avec les Conditions Géographiques. Par Raoul Montandon.

Commercial—Canals. *G.Z.* **20** (1914): 65-81. **Hennig.**
Seekanale und Seekanal-Projekte in ihrer historischen Entwickelung. Von R. Hennig.

Commercial—Shipping. **Vogel.**
Veröffentl. I. Meereskr. Berlin, N.F.; B., Heft 1 (1911): pp. 157.
Die Grundlager der Schiffahrtsstatistik. Ein kritischer Beitrag zur Wertung der Handelsflotte und des Seeverkehrs des Deutschen Reiches. Von Dr. Walther Vogel. *Maps and Diagrams.*

Commercial—Waterways. *Petermanns M.* **60** (1914): I. 61-63, 117-119. **Hennig.**
Der strategische Wert guter Binnenschiffahrtsstrassen. Von Dr. Richard Hennig.

Communications. **Rudolphi.**
Die Bedeutung der Wasserscheide für den Landverkehr. Von Dr. Hans Rudolphi. (Angewandte Geographie, hrsg. von Dr. H. Grothe, IV. Ser., 2. Heft.) Frankfurt: H. Keller, 1911. Size 9 × 6, pp. 153.

Communications—Passes. *J.G.* **12** (1914): 193-197. **Langwill.**
Historic mountain passes of the World. By Minnie J. Langwill.

Historical—Balboa. **Beltrán y Rózpide and others.**
B.R.S.G. Madrid **55** (1913): 409-433.
Vasco Nuñez de Balboa y el descubrimento del Mar del Sur. Discursos de los Sres. R. Beltrán y Rózpide u. a.

Historical—Flinders. ———
P.R.G.S. Australasia, South Aust. Br. **14** (1912-13): 48-74.
Captain Matthew Flinders, R.N.
Copies of reports to the French Government while Flinders was detained as a prisoner of war at Mauritius, &c.

Historical—Ptolemy's maps. *Z. Ges. E. Berlin*, 1913: 745-770. **Dinse.**
Die handschriftlichen Ptolemäus-karten und die Agathodämonfrage. Von Dr. Paul Dinse.
Summarized in the May number of the *Journal* (1914), p. 566.

History of Cartography. *Scottish G. Mag.* **30** (1914): 291-298. **Schütte.**
Ptolemy's Atlas: some additional notes. By G. Schütte. *Illustrations.*

History of Geography. *B.R.S.G. Italiana* **2** (1913): 1223-1276, 1362-1416. **Pinza.**
Due cosmografie, una egizia ed una sinaitica, in due piatti di bronzo trovati a Nimrud. Prof. Giovanni Pinza. *Plans, Sections, and Illustrations.*

BIOGRAPHY.

Bludau. *G.Z.* **20** (1914): 1-5. **Wagner.**
Alois Bludau. Von Hermann Wagner.
This well-known German cartographical expert died in September last. His original work lay chiefly in the technique of map-making.

Leichhardt. *Z. Ges. E. Berlin*, 1913: 787-791. **Diels.**
Zum Gedächtnis von Leichhardts 100. Geburtstag. Von L. Diels.

GENERAL.

British Empire—Census. *J.R. Statistical S.* **77** (1914): 381–414. **Baines.**
The Census of the British Empire, 1911. By Sir J. A. Baines.

British Empire—Oil. *J.R.S. Arts* **62** (1914): 471–489. **Perkin.**
The oil resources of the Empire. By Dr. F. Mollwo Perkin.

Education—Text-book. **Marsh.**
The Rambler travel books: Africa. Edited by Lewis Marsh. London: Blackie & Son, 1913. Size 7 × 5, pp. 80. *Sketch-map and Illustrations. Price* 9*d. Presented by the Publishers.*

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

British Isles—England and Wales. **Ordnance Survey.**

Sheets published by the Director-General of the Ordnance Survey, from June 1 to 31, 1914.

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Carnarvon, 11–7, 15, 16–4, 17–14. **Derby,** 50–3, 4, 7, 8, 9, 11, 12, 13, 15, 51–1, 2, 6, 9, 10, 13, 14, 54–8, 55–6, 7, 56–8. **Durham,** 56–13, 14, 57–2, 58–1. *Price* 1*s.* 6*d.* **Essex,** 68–12. **Hertfordshire,** 40–16, 45–15, 46–13. **Leicestershire,** 37–1, 42–10. **Middlesex,** 6–15, 7–12, 14, 10–15, 11–8, 9, 14, 19–10, 12. **Norfolk,** 64–13. **Notts,** 38–3, 11, 42–3, 41–2, 3, 6, 7, 10. 11, 12, 14, 15, 42–7, 10, 13, 45–8. **Staffordshire,** 64–3, 10. **Surrey,** 12–14, 18–9, 25–3, 8 10, 15, 34–1, 6, 10. **Warwick,** 4–3, 7, 10, 8–7, 10–7, 11–9, 10, 13. **Westmorland,** 37–48, 12, 16, 38–4, 8, 14, 39–1, 2, 7, 11, 41–4, 8, 16, 42–2, 4. 5, 11, 12, 13, 16. Sheets 37–(6 and 2), 7, (10 and 11). *Price* 1*s.* 6*d. each.* **Yorkshire,** 2–9, 14, 15, 4–7, 5–1. 5, 14, 11–3, 12–2, 13, 13–9, 10, 13, 14–16, 26–5, 27–12, 16. Sheets 2–(5 and 6), (2–16, and 2*a*, 13), 13–4. *Price* 1*s.* 6*d. each.* **Yorkshire,** 2nd revision, 233–14.

London Agents: E. Stanford, Ltd.; Sifton, Praed & Co.

British Isles—London. **Rocque.**

Rocque's map of London, 1746. Sheets I. to IV., each 13 by 19 inches. London: London Topographical Society, 1914.

France. **Lucerna.**

Morphologische Karte du Montblancgruppe 1 : 100,000 (1 inch to 1·6 stat. mile) von Dr. Roman Lucerna. Size 10 by 20 inches. *Petermanns Geogr. Mitteilungen*, Erganzungsheft Nr. 181. Gotha : Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

Germany. **Vogel.**

Karte der Deutschen Reiches und der Alpenlander im Massstab 1 : 500,000 (1 inch to 7·9 stat. miles) unter Redaktion von Dr. C. Vogel. Sheets (new editions) : 3, Börnholm ; 28, München. Gotha : Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

Hungary. **Government Printing Office, Budapest.**

Administrative map of the Kingdom of Hungary. [In Hungarian]. Scale 1 : 400,000 or 1 inch to 6·3 stat. miles. 8 sheets, each 32 by 24 inches. Budapest : Government Printing Office, 1914. *Price Kr.*12.

Norway. **Norges Geografiske Opmaaling.**

Topografisk Kart over Kongeriket Norge. Utgit av Norges Geografiske Opmaaling. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheet M 8, Harstad, 1912. Size 16 by 17 inches.—Langeneralkart over Norge. Utgit av Norges Geographiske Opmaaling. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Sheet XXVI., Vega. 1914. Size 19 by 24 inches. Christiania : Norges Geografiske Opmaaling. *Presented by the Director of the Norwegian Geographical Survey.*

ASIA.

India. **Surveyor-General of India.**

Maps published by the Survey of India during the quarter ending March 31, 1914. India and adjacent countries (layered edition), scale 1 inch to 32 miles, 12 sheets. India and adjacent countries, scale 1 : 1,000,000, sheets (provisional issue) 39, 53 (second edition), (1) layered, with shaded hills, (2) shaded and boundary coloured. Degree Sheets, scale 1 inch to 4 miles ; Bengal 78 D (provisional issue) ; Bihar and Orissa, 72 L (provisional issue) ; Bihar and Orissa, and United Provinces, 63 O (provisional issue) ; Burma, 93 K (67), 93 L (68) (second preliminary edition) ; Central India and Central Provinces, 64 E (provisional issue) ; Nepal and Behar and Orissa, 72 F, 72 J (provisional issue).—Standard maps, scale 1 inch to 1 mile : Assam 78–N 1, 78–O 1, 78–O 2, 78–O 13, 78–O 14 ; Bengal (preliminary edition), 72–O 16, 72–P 11, 72–P 12, 72–P 14, 72–P 15 ; Bihar and Orissa (preliminary edition), 63–O 12, 63–O 16, 64–O 13, 72–G 11, 72–G 15, 72–O 12, 72–P 4, 72–P 6, 72–P 9, 72–P 10, 72–P 13, 73–C 1, 73–C 4, 73–C 5, 73–C 7, 73–F 10 ; Bihar and Orissa and Central Provinces (preliminary edition), 64–O 10 ; Burma, 94–A 9 and 13 (297), 95–F 15, 95–F 16 ; Central Provinces, 64–A 3, 64–A 6, 64–A 7 ; Kashmir and Jammu, 43–J 11 ; Madras, 48–P 3, 58–B 11, 58–B 16 ; Madras and Coorg, 48–P 7 ; North-West Frontier Province (second edition), 38–O 5 ; Punjab, 44–I 16 ; United Provinces, 54–M 14, 63–A 10, 63–E 4. Calcutta : Map Record and Issue Office, 1914. *Presented by the Surveyor-General of India.*

Palestine. **"Les Missions Catholiques."**

Carte de la Terre Sainte (Palestine Moderne) dessinée d'après la Palestine Fund, les cartes de l'Etat Major Française, de V. Guérin, de A. Legendre, du P. H. Vincent, du Guide de Terre Sante, du P. Barnabé, et les documents les plus récents. Supplement au Journal *Les Missions Catholiques*, 1914. Scale 1 : 390,000 or 1 inch to 6·1 stat. miles. Size 36 by 26 inches. Paris : Les Missions Catholiques, 1914.

Russia—Caucasus. **Oswald.**

A geological map of the Caucasus. Compiled from the latest sources by Felix Oswald, D.SC., B.A., F.G.S., F.R.G.S. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. 2 sheets, each 15 by 25 inches. London : Dulau & Co., 1914. *Presented by Dr. Felix Oswald.*

The author has written explanatory notes to accompany the map.

AFRICA.

East Africa. **Perthes.**

Der Victoria-Njansa. Zu : Joachim Perthes "Der Victoria Njansa." Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. Gotha : Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

Senegal. **Service Géographique de l'Afrique Occle. Fr.**

Carte du Senegal. Levé par les officiers du Service Géographique de l'Afrique Occidentale Française. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheet VII., N' Diagne. Paris: Service Géographique de l'Armée, 1913.

Somaliland, Italian. **Carcoforo and Checchi.**

Somalia Italiana. Opere pubbliche eseguite dal 1910 in poi. Compilata da E. Carcoforo. Riproduzione di M. Checchi. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. Size 28 by 21 inches. Rome: Ministero delle Colonie, 1912. *Presented by the Ministro delle Colonie, Rome.*

Roads, railways, bridges, buildings, &c., constructed and under construction are coloured red.

Somaliland, Italian. **Carcoforo, Checchi, and Marconi.**

Carta dimostrativa della Somalia Italiana Meridionale. Compilata da E. Carcoforo. Riproduzione di M. Checchi ed A. Marconi. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. Size 28 by 21 inches. Rome: Ministero delle Colonie, 1912. *Presented by the Ministro delle Colonie, Rome.*

Shows land under cultivation, grass land, scrub, and forests.

Somaliland, Italian. **Egidi, Piccioli, and Cavicchi.**

Rilievo Speditivo Planimetrico eseguito nel 1910–1912 dai capitani Egidi, Piccioli e Cavicchi. Scala 1 : 200,000 (1 inch to 3·15 stat. miles). La Bassa Goscia; Uebi Scebeli presso Merca; Brava-Soblalle-Avai. Rome: Ministero delle Colonie, 1912. *Presented by the Ministro delle Colonie, Rome.*

The official report on the geodetic and topographical surveys in Italian Somaliland carried out under the direction of Captain S. Egidi during the two years from June, 1910, to June, 1912, was published by the Colonial Department in Rome in 1912.

Somaliland, Italian. **Gandolfi and Checchi.**

Mogadiscio. Pianta dimostrativa delle nuove costruzioni edilizie eseguite ed iniziate al 1° Ottobre 1912. Rilievo di G. Gandolfi. Riproduzione de M. Checchi. Scale 1 : 5000 or 12·6 inches to 1 stat. mile. Size 20 by 27 inches.—Porto di Brava. Scale 1 : 7,500 or 8·4 inches to 1 stat. mile. Size 16 by 20 inches.—Pianta di Mahaddei. Scale: 1 : 4000 or 15·8 inches to 1 stat. mile. Size 9 by 8 inches. Rome: Ministero delle Colonie, 1912. *Presented by the Ministro delle Colonie, Rome.*

Somaliland, Italian. **Russo.**

Somalia Italiana. Pozzi esistenti nel Territorio Galgial. Schizzo compilato a cura del Governo della Somalia Italiana dal Ten. Enrico Russo. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. Rome: Ministero delle Colonie, 1914. *Presented by the Ministro delle Colonie, Rome.*

Tripoli. **De Maria.**

Schizzo altimetrico dei dintorni di Giado-fassato. L'operatore Cap. De-Maria Paolo. Scale 1 : 25,000 or 2·5 inches to 1 stat. mile. Size 17 by 25 inches. Rome: Ministrero delle Colonie, 1914. *Presented by the Ministro delle Colonie, Rome.*

Tripoli. **Ministero delle Colonie Rome.**

Pianta di Tripoli. Scale 1 : 5,000 or 12·6 inches to 1 stat. mile. Size 20 by 13 inches. Bengasi e dintorni. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. Size 10 by 8 inches. Rome: Ministero delle Colonie, 1914. *Presented by the Ministro delle Colonie, Rome.*

Tripoli—Cyrenaica. **Governo delle Cirenaica, Ufficio Politico Militare.**

Governo della Cirenaica, Ufficio Politico Militare. Schizzo dimostrativo della Cirenaica. Scale 1 : 200,000 or 1 inch to 3·15 stat. miles. Sheet 1 and 3. Rome: Ministero delle Colonie, 1914. *Presented by the Ministro delle Colonie, Rome.*

AMERICA.

Canada. **Dept. of the Interior, Ottawa.**

Sectional map of Canada. Scale 1 : 190,080 or 1 inch to 3 stat. miles. Sheets: 114, Calgary, Alberta, and British Columbia, revised to June 1, 1914; 316, Vermilion, Alberta, revised to April 1, 1914; 319, Prince Albert North, Saskatchewan, revised to May 1, 1914; 368, Green Lake, Saskatchewan, revised to May 1, 1914; 512, Montagneuse, Alberta, revised to May 1, 1914. Ottawa: Department of the Interior, Topographical Surveys Branch, 1914. *Presented by the Department of the Interior, Ottawa.*

AUSTRALASIA.

Admiralty Islands. **Cohn.**

Die Admiralitätsinseln (Deutsch-Neuguinea). Auf Grundlage der deutschen Seekarte ergänzt von Dr. Ludwig Cohn. Scale 1 : 500,000 or 1 inch to 7·89 stat. miles. Size 14 by 13 inches. *Petermanns Geogr. Mitteilungen*, Jahrgang, 1914, I., Tafel 41. Gotha : Justus Perthes, 1914. *Presented by Prof. Dr. H. Hauck.*

WORLD.

World. **Stieler**

Stieler's Hand-Atlas. 100 Karten in Kupferstich mit 162 Nebenkarten. Herausgegeben von Justus Perthes' Geographischer Anstalt in Gotha. Sheets : 8, Deutsches Reich ; 14, Schweiz ; 15, Ostalpen ; 43, Russland und Skandinavien ; 44, Russland, Bl. 1 ; 46, Russland, Bl. 3. Gotha : Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

These sheets are reprints with slight corrections.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, from July 5 to 29, 1914. *Presented by the Hydrographer, Admiralty.*

New Charts—England, south coast : a chart of Spithead showing the assembly of the Fleet, July 15 to 20, 1914, 3*s*. No. 3274, China, Yangtse-kiang : Tung-ting lake and Siang-kiang, Liu-cha-po crossing, Sha-nie-kan, Chang-sha ; Yuen-kiang—Chang-teh to Chien-chi-chu, Taiping canal ; Yangtse-kiang—Compton reach to Ichang, 3*s*. 2843, North America, east coast : Chesapeake bay entrance, 3*s*. **New Editions**—1905, England, south coast : Southampton water, 4*s*. 3547, Scotland, east coast : Logie head to Tarbet ness, including the entrances to Inverness and Cromarty firths. (Plans : Buckie, Lossiemouth, Hopeman, Burghead), 4*s*. 3165, Ireland, west coast : Harbours in Bantry bay : Bantry harbour, Glengariff harbour, 3*s*. 3562, Baltic, Little Belt : Flensburger förde, including Alsen sund and Augustenburger förde, 3*s*. 1662, Norway, west coast : Skudesnaes fiord and approach to Stavanger, 3*s*. 2694, France, west coast : The channels between Ile d'Ouessant and the mainland, 3*s*. 1459, China, south-east coast : Hongkong harbour, 3*s*. 2657, Japan, Nipon : Gulf of Tokyo or Yedo, 3*s*. 372, Japan, Kiusiu : Kagosima kaiwan (Plans : Hamanoichi road, Makurazaki wan, Odomari wan). Plan of Sakura-sima-seto on this sheet erased, 3*s*. 2111, Borneo, north-west coast : Nosong point to Ambong bay (Plan added : Dinawan anchorage), 5*s*. 1058, Australia, west coast : Rottnest island to Warnbro' sound, showing the approaches to Gage roads, Swan river, and Cockburn sound (Plans : Cockburn sound—north channel, Cockburn sound—south channel), 3*s*. 2540, New Zealand, south island : approaches to Awarua or Bluff harbour and New river, 3*s*. 2591, New Zealand, South island : River Waiau to Cape Foulwind (Plan : Greymouth harbour). Plan added : Buller bay and Westport harbour, 3*s*. 1323, South America, west coast : Independencia bay to Iegueta bay (Plans : Ancon bay and adjacent islands, Chincha isles, Salinas and Chica bays). Plan added : Mala cove, 2*s*. 494, West Indies, Ports and anchorages in Martinique : Fort de France (Fort Royal) bay, Fort de France harbour, La Trinité bay, Cul-de-sac Marin, 2*s*. 2492, North America, east coast : Bay of Fundy to Block island, 3*s*. 1631, Labrador : Harbour on the coast of Labrador : Blanc Sablon, Forteau bay, 3*s*.

(*J. D. Potter, Agent.*)

Atlantic **Soley.**

The Circulation in the North Atlantic in the month of February ; ditto, in the month of August. The Circulation in the South Atlantic during the Southern Winter ; ditto, during the Southern Summer. The Circulation in the North and South Atlantic. The Caribbean sea and its currents. By Lieut. John C. Soley, U.S. Navy (retired), in charge of Branch Hydrographic Office, New Orleans, Washington. U.S. Hydrographic Office, 1911–12. *Presented by Lieut. C. Soley, U.S. Navy.*

Each of these current charts is accompanied by explanatory notes by Lieutenant Soley.

Indian Ocean. **U.S. Hydrographic Office.**

Pilot chart of the Indian Ocean, August, 1914. Washington : U.S. Hydrographic Office, 1914. *Presented by the U.S. Hydrographic Office.*

Pacific, North. **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, August, 1914. Washington: U.S. Hydrographic Office, 1914. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

China. **Ainscough.**

Forty-four photographs of Western China, taken by T. M. Ainscough, Esq. *Presented by T. M. Ainscough, Esq.*

These photographs were taken on a journey in 1913 across China and along the border of Chinese Tibet to Ta-chien-lu, thence along the main road to Teng-yueh T'ing and over the Sima route to Myitkyina. The size of the photographs is 5 by 4 inches.

(1) Rope bridge at Kuan Hsien; (2) Barrage at Kuan Hsien; (3) View in the state of Wa-ssu, river Min in foreground; (4) Stronghold of Tong-ling Shan, seat of chief of Wa-ssu; (5) The heir apparent of Wa-ssu; (6) Village of Kam-po; (7) The road to Tsa-ka-lao; (8) View to the west from Tsa-ka-lao; (9) Lamasery at Tsa-ka-lao; (10) Ta-chien-lu gorge from Wa-ssu-kou; (11) Ta-chien-lu river in gorge above Wa-ssu-kou; (12) Ta-chien-lu from the south; (13) To-chien-lu from the south-west; (14) "The gate of Tibet," Ta-chien-lu; (15) Yak transport in Ta-chien-lu; (16) A water-driven prayer-wheel; (17) Yak grazing; (18) View of peaks to south from Ta-chien-lu; (19) Small elephant pass with block house; (20) Têng-hsiang-ying; (21) Fortified village in the Chien Ch'ang valley; (22) Coolie with load of white wax insects; (23) Ma-an-shan ferry over the An-ning Ho; (24) The valley of the Ya-lung looking north; (25) Ho-pien-ts'un ferry over the Ya-lung; (26) The Ya-lung at Ho-pien-ts'un looking north; (27) Right bank of the Ya-lung at Ho-pien-ts'un; (28) The brine wells at Pai-yen-ching; (29) Rice-fields at Huang-t'sao-pa; (30) Camp in pine forest; (31) Boundary of Ssŭ-chuan and Yun-nan at Hui-wu-tzu; (32) Group in the yamen at Hua-ping-hsien; (33) Encampment in Yang-tze valley; (34) Yang-tze valley at Chin-chiang-kai; (35) Ferry on Yang-tze at Chin-chiang-kai; (36) Farmyard at Pien-chio-kai; (37) From chain bridge over the Shun-pi-ho; (38) Mule caravan crossing Shun-pi-ho; (39 and 40) Bridge over the Mekong; (41) Mekong gorge looking north; (42) Twin span bridge over the Salween; (43) Salween valley looking north; (44) Salween valley looking south.

Egypt. **Johnston.**

Twelve photographs of Egypt taken by Miss Dorothy E. Johnston, 1914. *Presented by Miss Dorothy E. Johnston.*

Very good enlargements of photographs taken by Miss Johnston in January and February of this year. They measure 6 by 4½ inches.

(1) Delta barrage; (2) Watercarriers at Old Cairo; (3) Sphinx, Memphis; (4) Barrage village; (5) Excavating, Luxor; (6) Nubian girl, Luxor; (7) Der el Bahri; (8) Wadeyen, Thebes; (9) Sakkaye, plain of Thebes; (10) Shadûf at Edfu; (11) Locks, Aswan dam; (12) Bishereen at Aswan.

Mongolia. **Binsteed.**

178 photographs of Mongolia taken by G. C. B. Binsteed, Essex Regt. *Presented by G. C. B. Binsteed, Esq.*

These photographs were taken on a series of four journeys in 1912 and 1913, and not on a single journey as stated in the note accompanying the titles of the photographs published in the August number of the *Geographical Journal.*

Turkey. **Johnston.**

Twelve photographs of Turkey taken by Miss Dorothy E. Johnston, 1914. *Presented by Miss Dorothy E. Johnston.*

These photographs, which measure 6 by 4½ inches, were taken during the early part of this year.

(1) The Balkan mountains; (2) Street in Stambul; (3) Blind seed-sellers outside Mosque Suleiman I., Stambul; (4) Turkish women disembarking at Galata bridge; (5) Mahonna on the Golden Horn; (6) Yeni Mahale on the Bosporus; (7) Armenian baker, Rumeli Hissar; (8) Dog's island, Sea of Marmara; (9) Street at Scutari; (10) Mudania; (11) Ancient bridge, Brusa; (12) Byzantine Han, Brusa.

N.B.—It would greatly add to the value of the collection of Photographs which have been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

REGIONAL MAP

Showing the area covered by the

AUSTRALASIAN ANTARCTIC EXPEDITION

1911 - 14.

under SIR DOUGLAS MAWSON

Including tracks of the "Aurora" and most of the deep-sea soundings.

Scale 1:15,000,000 or 1 Inch = 237 Stat. Miles.

100 0 100 200 300 500

g. Gravel. h. Hard. m. Mud. os. Ooze. r. Rock
s. Sand. sh. Shells. ss. Sandstones. cl. Clay. st. Stones.

Depths in fathoms.

Soundings shown thus 1235 indicate no bottom.

Antarctic summer cruise 1911-12 _____ *1st Sub antarctic cruise 1912.* —o—o—o—

" " " *1912-13* — - — - — *2nd* " " " *1912.* —x—x—x—

" " " *1913-14* _ _ _ _ _ *Pack ice 1914* .....

120° 130°

40° 50° 60°

80 90° 100° 110° 120° 130° 140°

2600 cl.

2830 (Scott)

Wilkes Land

Adelie Land

Knox Land

Queen Mary Land

Kaiser Wilhelm II Land

Gaussberg

Winter Qrs. of the Gauss 1902-3

Drygalski

Shackleton Shelf

Termination Ice Tongue

Bruce Rise

Lashly

Challenger

Scott

Heard

Kattie

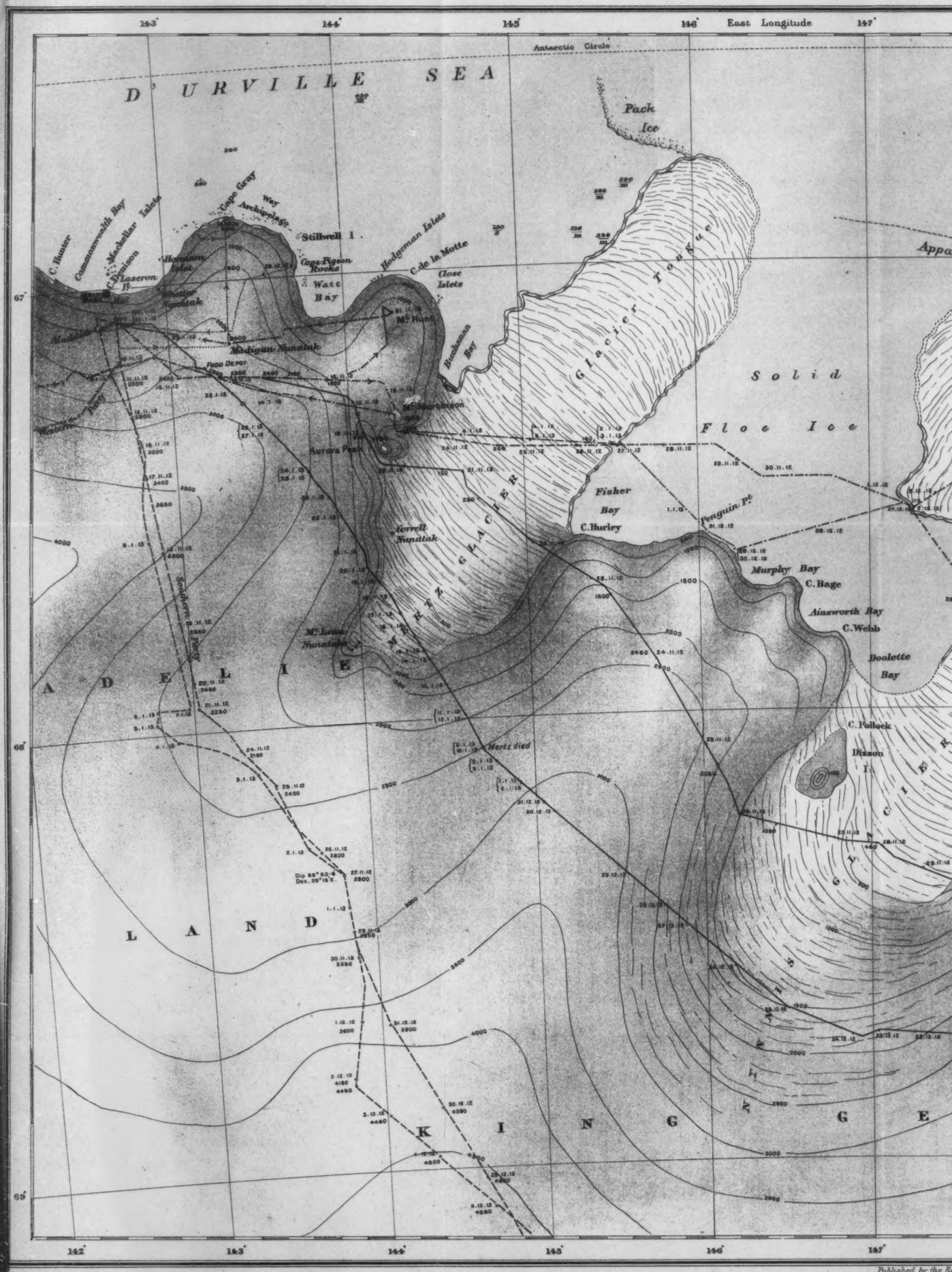
Main Base Wireless

Modified Conical Projection, with rectified meridians and erroriess parallels 40° and 70°

Published by the Royal Geographical

Geographical Society

ANTARCTIC REGIONS.
AUSTRALASIAN EXPEDITION.



Conical Projection.

Published by the R

148° 149° 150° 151° 152°

AUSTRALASIAN ANTARCTIC EXPEDITION

KING GEORGE V LAND

Showing tracks of the Eastern Sledging Parties from the Main Base.

Scale 1:1,000,000 or 1 Inch = 15·78 Stat. Miles.

10 0 10 20 30 40 50

Far-Eastern Party _____

Eastern Coastal Party _ _ _ _ _

Near-Eastern Party (A) _ . _ . _ . _

(B) .....

s sand m mud. 250 no bottom.

Heights in feet. Soundings in fathoms

67°

H e a v y

P a c k I c e

Apparent Limit of Floe Ice Dec. 1912

Mertz Glacier

Tongue

S o l i d F l o e I c e

68°

Buckley Bay

Organ pipe Cliffs

C. Blake

C. Wild

C. Spencer

Horn Bluff

Deakin Bay

C. Freshfield

Cook Bay

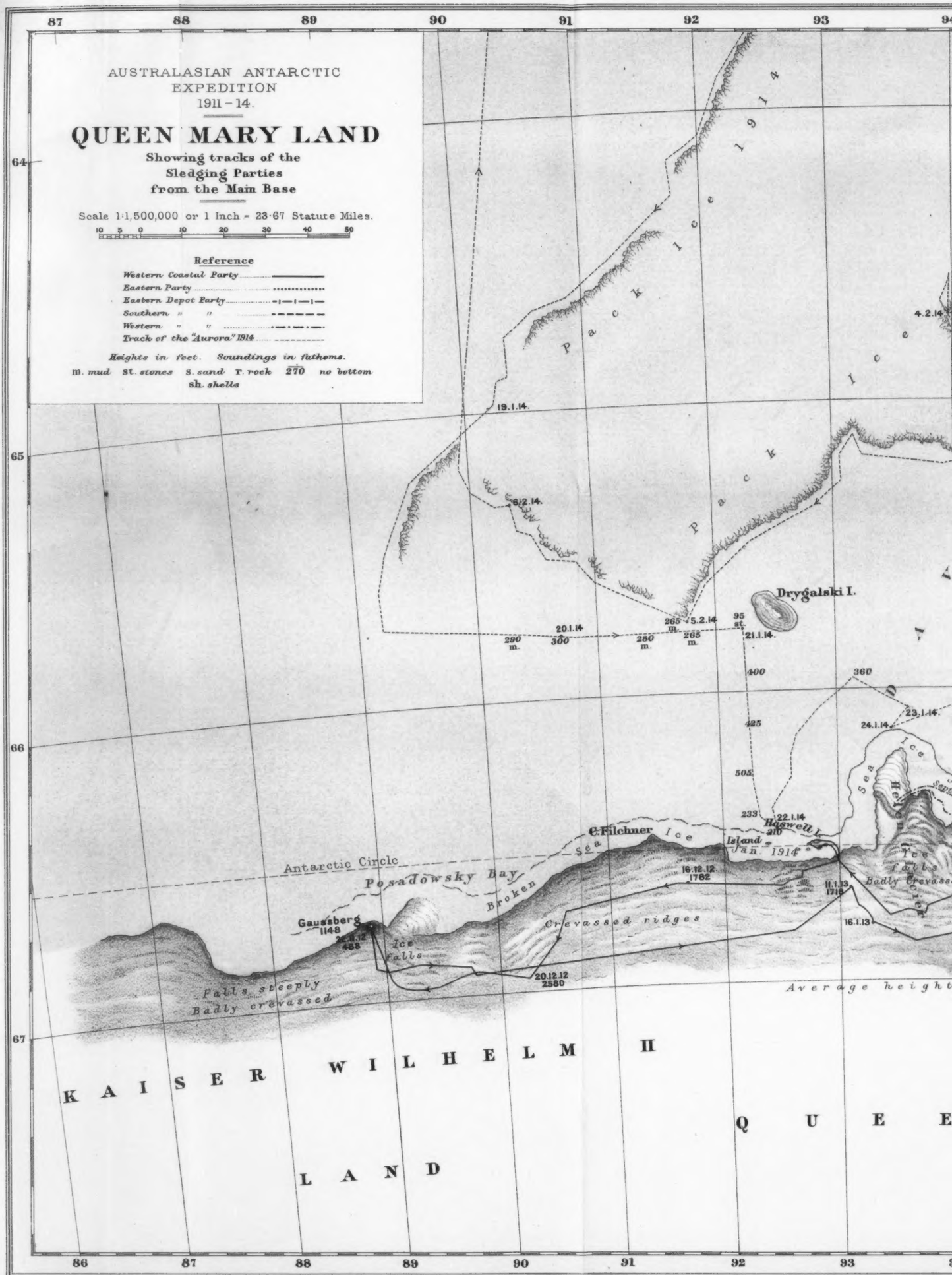
69°

E O R G E V L A N D

140° 149° 150° 151° 152° 153°

d by the Royal Geographical Society

ANTARCTIC REGIONS
AUSTRALASIAN EXPEDITION.



Conical Projection

Published by the Roya

94 95 96 97 98 99 East Long. 100 101

64 65 66 67

Termination Ice Tongue

Pack Ice 1912

1914

SEA

SHELF

KLETON

SHACK

ISLAND

Masson I.
Totally ice capped
abt. 1300
Falls

Henderson I.
abt. 600
Totally ice capped

David I.
abt. 1000

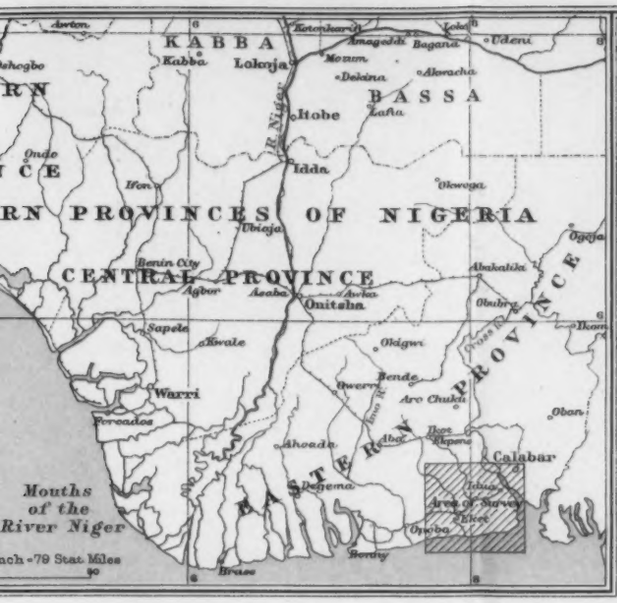
Hordern I.
Approximate position of distant land

Winter Quarters
Line of Crevasses
Rise in ice surface
Gradual Slope
Falls
Ice cliffs
Grounded Berg
Snow rise
Junction Camp
Sept. 1912
Sept. 1914
Jan. 1912
Jan. 1914
Sept. 1912

C. Moyes
C. Dovers
Delay
C. Charcot
C. Kennedy
Reid Gl.
Peninsula abt. 800
Robinson Bluff
Impassable
Apparent coast line
C. Gerlache
C. Hoadley
C. Harrisson
C. Jones
Cascades
Crevassed
Valley
SCOTT GLACIER
DENMAN GLACIER
Mt Barr Smith 4320 approx.
Mt Strathcona
Mt Amundsen
Mt Sandow abt. 4000
Northcliffe Gl.
Gaussen Nunataks
Gilles Nunataks
Direct Slope Nunatak
Summit
Nunatak
Nunatak
Nunatak
Nunatak
Nunatak
Falls
Falls
Falls

LIST OF POSITIONS.

Place.	N. Latitude	E. Longitude	Remarks.
IKOT OBO	4°43′35″	8°01′08″	Rest House
OYUBIA	4 44 44	8 08 40	,,
IDUA ORON	4 49 36	8 13 00	,,
AWA	4 39 16	7 50 23	,,
IBENO	4 33 56	7 58 33	,, (Uben Akang)
JAMESTOWN	4 39 11	8 18 12	Old Rest House
AKAIYA	4 52 48	8 07 40	Native Rest House
ADUT NSITT	4 49 40	8 01 15	Principal Square (near Akpan Nteyo's Compound)
NDUKPO ISI	4 47 34	7 57 35	Old School
IKOT EYO	4 46 01	7 57 26	School
IKOT ETOBO	4 43 39	7 54 45	,,
EKPENE OBO	4 39 46	8 01 15	,,
ATEBIO	4 39 25	8 07 55	,,
UKAW ANTIKKA ...	4 39 02	8 13 42	,,
UNYENGA	4 37 53	8 11 09	,,
UYA ORON	4 48 11	8 10 49	,, at Eyo Ifonn
URUA EYE	4 41 50	8 12 03	,,
NTETE'S	4 36 01	8 04 04	225 and 170 yds. to Landing Place


KABBA
BASSA
PROVINCES OF NIGERIA
CENTRAL PROVINCE
EASTERN PROVINCE
Mouths of the River Niger
Area of Survey
Lokoja
Itobe
Idda
Onitsha
Awka
Abakaliki
Calabar
Warri
Sapele
Asaba
Oguta
Oban
Degema
Brass
Bonny
Opobo
Ikom
Obudu
Ogoja
Udeni
Bagana
Kotonkarfi
Amagedde
Mozum
Dekina
Aloracha
Zaria
Ubeoga
Ubiaja
Benin City
Agbor
Awka
Abo
Ikom
Oturkpo
Oweri
Bende
Aro Chuku
Oloigwi
Awale
Abo
Ikpe
Ikpere
Ibom
Ogoja
Obubra
Oban
Shoda
Degema
Ibuno
Ekpri
Ovoba
Bonny
Brass
Lokoja
Kabba
Mozum
Dekina
Aloracha
Zaria
Ubeoga
Ubiaja
Ogoja
Abakaliki
Awka
Asaba
Onitsha
Obubra
Ikom
Oturkpo
Oweri
Bende
Aro Chuku
Oloigwi
Awale
Sapele
Warri
Forcados
Shoda
Degema
Brass
Bonny
Opobo
Oban
Calabar
Ibuno
Ekpri
Ovoba
Abo
Ikpe
Ikpere
Onde
Ifon
Ubiaja
Benin City
Agbor
Awka
Asaba
Onitsha
Sapele
Awale
Warri
Forcados
Mouths of the River Niger
Area of Survey
Ekpri
Ovoba
Bonny
Brass
Calabar
Oban
Ikom
Obubra
Ogoja
Abakaliki
Awka
Asaba
Onitsha
Aro Chuku
Bende
Oturkpo
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Awka
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Idda
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Zaria
Mozum
Dekina
Aloracha
Lokoja
Kabba
Bagana
Udeni
Kotonkarfi
Amagedde
Lokoja
Kabba
Mozum
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Ubeoga
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Bagana
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Amagedde
Lokoja
Kabba
Mozum
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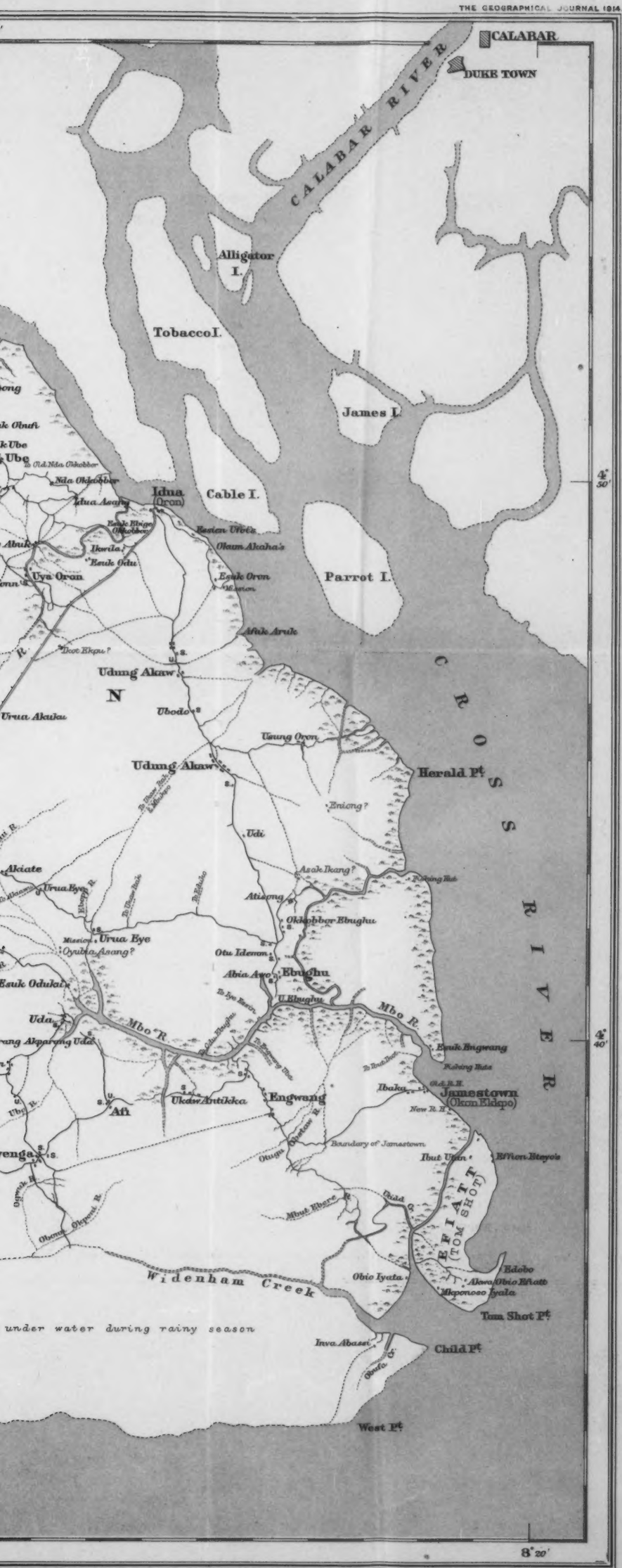
Aloracha
Zaria
Itobe
Idda
Ubeoga
Ubiaja
Ifon
Onde
Benin City
Agbor
Awka
Asaba
Onitsha
Abakaliki

ROVINCES
IA.
DISTRICT
urvey
LBOT B.A.
- 2·37 Stat. Miles.
3 4 5
8°10'
To Ikpa
Rdk.
To Ndian Ebomm.
Esuk Inwan Akaiya
Iker Abut's?
Old Road
Akaiya
Ndikpaw
Ayi Aya R. (Goes to Inuk)
O K K O B B O R
To Ndian Ebomm.
Amamong
Okopedi
Atabong
Ikot Akpabi
Boundary of Ik. Inyang
Ube Etim
Obufi
Esuk Obufi
Ndun Atai
Esuk Ube
Ikot Inyang
To Ekpe Inwang
To Eyo Thom
Ube
Adut Nteyor
U. Uding Udim's
Odobo
Ebige Okkobbor
Orok Avong's
Mkpe Sua Avong
Urutin
Iwak Atai
Utine?
Rak Uya ete
Akapo Abut
Etu Obu Udum
Iwak Ik. Okkobbor Nsitt
Atiabang
Eyo Ifenn
Ikot Abasi
Ubium River
Nsin
Ata Ekkin
Akudu
Ikano?
Ik. Ibi Ainyi
Udemm Ikara Awa
Ura Oron R.
O
Aweme
R
O
Ik. Essen?
Ik. Ise?
Eyo Okai?
Urua Akak
Nka Nyaw
U. Akwong
Afa Atai?
Oyubia
Urua Ita (Oron)
Mission
Sleeping Sickness Camp
Okoici?
Eyo Udaw
Ikot Oku
Mbukpo?
Akai Ikpe?
Akiate
Oduku
Ik. Okpo Udaw?
Oye Ofu R.
Esuk Odukat
Ekpene Obo
Ukwa Ata
Ukkokk
Atebin
Adukum
Ikpa
Eyo U.
Ukwa
Ndun Eyo
Akpa Utung?
Ekaw Enim?
K
E
T
Edor
Ik. Ekkpo Udaw
Edu Nko?
Odoron Ikut?
Nak Inyan
Unyenga
Ibut Ebopp Beach
Esuk James Ekkpo Aboosi
Ntete's
Old Camp
creek
Mostly under water during rainy season
Mostly under w
Ruhung Ikot
Ruhung Ikot
Published by the Royal Geographical Society.
8°10'



EKET DISTRICT
Talbot.